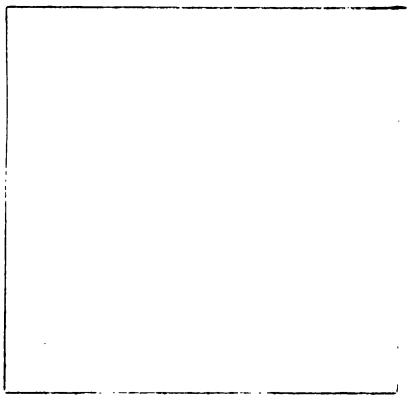

J C Branner

DEPARTMENT OF THE INTERIOR

BULLETIN

OF THE

UNITED STATES

GEOLOGICAL SURVEY

No. 126

WASHINGTON
GOVERNMENT PRINTING OFFICE
1895

J C Branner

UNITED STATES GEOLOGICAL SURVEY

CHARLES D. WALCOTT, DIRECTOR

A

MINERALOGICAL LEXICON

OF

FRANKLIN, HAMPSHIRE, AND HAMPDEN COUNTIES MASSACHUSETTS

BY

BENJAMIN KENDALL EMERSON

12 6

WASHINGTON

GOVERNMENT PRINTING OFFICE

1895

CONTENTS

ILLUSTRATIONS

CONTENTS.

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LETTER OF TRANSMITTAL.

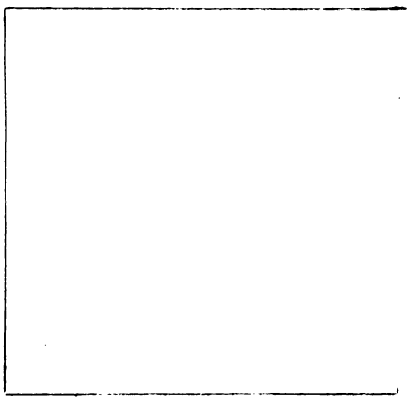
AMHERST, MASS., *December 20, 1894.*

SIR: I have the honor to transmit herewith, for publication as a bulletin of the United States Geological Survey, a mineralogical lexicon of Franklin, Hampshire, and Hampden counties, Mass. This lexicon was prepared to accompany a monograph on the geology of this area, but it has seemed desirable to present it for separate publication.

Very respectfully,

BEN. K. EMERSON.

Hon. C. D. WALCOTT,
Director United States Geological Survey.



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1886. **Albite.** Northampton.

In veins in the granite at a quarry south of W. N. Moore's east of Florence, as hollow incrustations—pseudomorphs after laumonite. The hollow forms show on both outside and inside fine drusy surfaces of fresh, limpid, much-twinned crystals. Extinction on M 18° 45′—19°. (This pseudomorph has been cited only from Scotland by J. R. Blum: Dritter, Nacht. zu den Pseudomorphosen, 1863, Erlangen, p. 67.)

1891. **Periklin.**

Appears (1) in fine large crystals in cavities in the sericite schists at various places in Chester; (2) in hornblende-schist, adjoining granite, east of the soapstone quarry in North Blandford; (3) in fissures in crushed argillite, in Whately; (4) in crystals over an inch long, opaque white, with polished surfaces, closely resembling the forms from the Tyrol, at Ice Rock, a mile below the village of Shelburne Falls, on the river.

For albite-muscovite pseudomorphs after spodumene, see Cymatolite.

ALLANITE.

1841. **Rutile.** Northampton and Williamsburg.

"Associated with quartz in the sienite is a mineral crystallizing in four-sided prisms, which I have been disposed to refer to rutile." (The sienite is the same as the tonalite mentioned below.)

E. Hitchcock: Geol. Mass., p. 677.

1876. **Allanite.** Pelham, Ware, Becket.

C. U. Shepard: Catalogue of Minerals within 75 miles of Amherst, p. 7.

1876. **Allanite.** Hatfield, Pelham, Gilbertville, Buckland.

It is a constant accessory constituent of the Hatfield tonalite and is quite abundant in the granular anorthite at the Pelham asbestos quarry. The crystals are here one-twelfth to one-half inch across, and 1 to 2 inches long. Some crystals are bordered by a dark-brown layer 1 mm. thick and cleaving parallel to a plane rectangular to the prism, which latter shows a varnished surface when the outer layer is removed. A marked puckering of the feldspar surrounds the prisms of allanite.

Certain crystals are deep bottle-green in longitudinal section, black in transverse. Under the microscope the Pelham allanite in cross-section about at right angles to c is clear and free from fissures. It shows a clear dichroism in two shades of red-brown and undulose polarization in stellate bands of shade radiating from several points. It shows no border growth except a fringe of sagenitic rutile, and no decomposition.

It occurs also in the Pelham gneiss (in which the peculiar anorthite-olivine lens, generally cited as the asbestos quarry, is included) at the agricultural college quarry, in the north part of the town. It appears here in the small pebble-like "augen" of orthoclase, which are strung along certain lamination planes in small square prisms, changed generally into a red-brown hydrated variety. A radiated puckering of the feldspar surrounds each crystal. The finest crystals occur at Gilbertville, near Ware, in coarse granite—flattened prisms 2 inches long and a half inch wide, with corroded and varnished surfaces.

In Buckland, on the hilltop a few rods south of Harris's soapstone quarry; as usual, superficially decomposed to a red substance.

1894. **Allanite.** Pelham.

The well-known asbestos mine in Pelham, Mass., is opened on a great dike of black olivine-enstatite rock inclosed in gneiss. The metamorphism which changed the Cambrian conglomerate into gneiss changed the olivine rock, along a network of fissures, into anthophyllite, arranged in transverse fibers, meeting in a suture—a macroscopic olivine network.

A macroscopic "reaction rim" was produced between the two rocks by the interaction of the very basic and the very acid members. Against the olivine rock is a broad band, characterized by very basic minerals—thick bands of biotite, containing apatite, and fine large corundum crystals. Then comes anorthite full of allanite, rutile, and tourmaline in large masses. Then the anorthite graduates into andesite, and this, by the gradual appearance of quartz, microcline, and biotite, into the common, well-bedded gneiss.

A crystal of corundum was shown—largely fine-blue sapphire, in which was a crystal of allanite a half inch across, which had coerced the corundum into a fine radiated puckering nearly an inch wide, outside of which the fine cleavage of the corundum asserted itself. The same puckering surrounds the allanite in the massive anorthite.

B. K. Emerson: Bull. Geol. Soc. Am., VI, p. 474.

ALLOPHANE.

1868. **Allophane.** Greenfield.

White and greenish; in sandstone quarry one-half mile east of village of Greenfield.

J. D. Dana: Min. Localities, Treatise, p. 769.

1880. **Allophane.** Belchertown.

In greenish coating on pink feldspar veins; in hornblende-schist at Kelleys Crossing, in Belchertown.

AMESITE.

1876. **Amesine** (nov. sp.?). (Shepard.) Chester emery mine.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst, p. 4.

(Named after Mr. James T. Ames, of Chicopee, part owner of the emery mine.)

1876. **Amesite.** Chester.

"M. Shépard a donné ce nom à un minéral qui se trouve sur du diaspore à Chester et qui resemble comme couleur et comme éclat au talc vert du Tyrol, ou bien à certaines chlorites du Piémont; il rappelle aussi l'aspect de la pyrosclérite de l'île d'Elbe, quoique sa couleur soit plus pâle (Desc.). H. 2.5–3.0 gr. 2.71, op. ax. positive.

"SiO_2	21.40
"Al_2O_3	32.30
"FeO	15.80
"MgO	19.90
"H_2O	10.90

"C'est donc une espèce distincte."

M. F. Pisani: Notices Minéralogiques; Compte Rendu, Vol. LXXXIII, p. 166.

In the following table the full column of the geological formations present in the area is given as established in the monograph.

All the minerals are referred to their proper place in this column.

PLEISTOCENE.

Synonyms.

Terrace gravels, sands, and clays.
Champlain clays.
Glacial bowlder-clays.

Equivalents along the eastern border of the area and in Worcester County.

TRIASSIC.

The Sugar Loaf arkose, or feldspathic sandstone.

The Mount Toby conglomerate.

The Long Meadow brownstone, or fucoidal sandstone.

The Granby tuff, or diabase ash beds.

The Holyoke and Deerfield diabase beds, or the trap.

DEVONIAN.

Bernardston series.

1. Mica-schist and gneiss.
2. Amphibolite.
3. Quartzite, with limestone beds carrying fossils.

SILURIAN.

Clay-slate.
Calciferous mica-schist.
Spangled slates (Hitchcock).

Conway schist, with beds of limestone and amphibolite.
Goshen schist, with beds of quartzite.

Brimfield fibrolite schist.

Hawley schist, with beds of amphibolite and iron ores.
Savoy schist, with beds of amphibolite.
Chester amphibolite, with beds of saxonite, serpentine, steatite, emery, and magnetite.
Rowe schist, with amphibolite beds.
Hoosac schist (upper part).

Hardwick gneiss and Paxton quartz schist.

Talcose slates, or talcoid slates.
Hydromica-schists (Dana).

CAMBRIAN.

Hoosac schist (lower part).
Becket gneiss.

Monson and Pelham gneiss.

PRE-CAMBRIAN.

Washington gneiss.
Lee gneiss.
Hinsdale limestone.

LEXICON.

ACMITE.

1841. **Acmite.** Chester. See Tourmaline.
E. Hitchcock: Geol. Mass., 1841, p. 614.

ACTINOLITE.

See Amphibole.

AGLAITE.

1877. **Aglaite.** (Julien.) Chesterfield.
A. A. Julien: Synonym of cymatolite; a pseudomorph after spodumene. See ALBITE, 1877. (Name never used.)

ALBITE.

1817. **Kieselspath.** Chesterfield.
G. F. L. Hausmann: Göttinger Gelehrte Anzeigen, p. 1401.

1819. **Siliceous feldspar.** Chesterfield, Goshen.
"When I first examined this rock, soon after its discovery by Dr. Hunt in Northampton, I determined the feldspar to be a new variety, which has since been confirmed by Professor Hausmann, and now ranks as a new subspecies, under the name of siliceous feldspar." A full and accurate description of the mineral follows:
An analysis of Stromeyer is given:

SiO_2	70.68
Al_2O_3	19.80
NaO	9.06
CaO, FeO, MgO	.38
	99.91

On the Tourmalines, etc.; G. Gibbs: Am. Jour. Sci., 1st series, Vol. I, p. 346.

1820. **Siliceous spar.**
"Soon after Dr. Hunt discovered this mineral, Colonel Gibbs pronounced it a new one."
A. Eaton: Index, p. 121.

1824. **Hornblende.** Pelham.

Also actynolite in asbestos, Pelham, and likewise a granular variety of the same mineral in large masses—the grains equaling in size the grains of coarse gunpowder, and very easily separable. Its granular structure may be the result of semidisintegration.

C. W. Shepard: Min. Loc.; Am. Jour. Sci., 1st series, Vol. VIII, p. 235. Should be C. U. Shepard.

1825. **Fasciculite.** Charlemont (Dr. H. W. Wells).

Very fine.

J. Porter: Min. Loc.; Am. Jour. Sci., 1st series, Vol. IX, p. 54. Robinson's Cat., p. 40.

1825. **Cummingtonite.** Plainfield in considerable quantities.

It is perfectly well characterized, many of the specimens being elegant and even superb.

J. Porter: Min. Loc.; Am. Jour. Sci., 1st series, Vol. IX, p. 54.

1825. **Asbestus.** Zoar.

The ligniform variety abundant in serpentine on the banks of Deerfield River (H. M. Wells).

Robinson's Cat., p. 78.

1825. **Actynolite.** Westfield, occasionally; fine.

Emerson Davis: Min. Not.; Am. Jour. Sci., 1st series, Vol. IX, p. 252.

1825. **Cummingtonite (Fibrolite).** Cummington.

E. Emmons: Boston Jour. Phil. and Arts, Vol. III, p. 395.

1825. **Fibrolite.** Chesterfield.

E. Hitchcock, ibid., p. 610.

1825. **Anthophyllite.** Zoar (Charlemont).

In serpentine resembles that found in Blandford.

C. U. Shepard: Boston Jour. Phil. and Arts, Vol. III, p. 309.

1825. **Anthophyllite.** Blandford.

"Mr. Alonzo Chapin has lately presented me with a mineral that he has discovered in considerable abundance in the town of Blandford, which I find to be very well characterized anthophyllite. In a green talcose rock having a slaty structure, with veins of blackish serpentine running through it; massive and in long acicular prisms, radiating, hair brown." Cleavage, 125°. Infusible.

C. U. Shepard: Min. Loc.; Am. Jour. Sci., 1st series, Vol. IX; also Boston Jour. Phil. and Arts, Vol. II, p. 395.

1827. **Cummingtonite.** Chesterfield, Goshen.

In mica-slate.

A. Nash: Lead Mines of Hampshire County; Am. Jour. Sci., 1st series, Vol. XII, p. 269.

1827. **Amianthus.** Plainfield.

White, very fine and delicate.

J. Porter: Min. Loc.; ibid., p. 378.

1828. **Anthophyllite.** Blandford, 20 rods southeast of village; East Granville road; also 1 mile south on same road.

Hitchcock searched out the mineral at the above locality as the anthophyllite described by Shepard in the preceding citation. It fused, and so he sent specimens to Professor Shepard to see if they were the same as his. Professor Shepard writes that the mineral sent agrees in crystallographical characters and in its fusibility with a genuine specimen of anthophyllite *from Norway*, and says: "This led me to reexamine a mineral from

1828. **Anthophyllite**—Continued.

the same town which I recently described in the Boston Journal under the name of anthophyllite. I find myself to have been in error as to my examination of its crystalline form and some other characters. At present I regard this mineral as constituting a new species, of which I propose at a future day to give a particular account."

E. Hitchcock: Min. Ex.; Am. Jour. Sci., 1st series, Vol. XIV, p. 221.

(The mineral described above by Hitchcock is the coarse-bladed hornblende in the Osborne soapstone quarry, which is partly brown and associated with black serpentine. That first described by Professor Shepard, if infusible, may have been enstatite from farther south. The promised description of it as a new species apparently never appeared.)

1828. **Actynolite**. Center of Shutesbury opposite mineral spring.

E. Hitchcock: Min. Ex.; ibid., Vol. XIV, p. 217.

1828. **Anthophyllite**. Chesterfield, 1 mile north of meetinghouse on land of Mr. Searle, with kyanite and zoisite.

E. Hitchcock: Min. Not.; ibid., p. 216. (This is the brown fibrous hornblende associated with large garnets and called above cummingtonite.)

1835. **Anthophyllite**. Chesterfield, Blandford.

With quartz in mica-slate.

C. U. Shepard: Min., Vol. II, Part I, p. 27.

(The Chesterfield mineral was cummingtonite. The Blandford mineral was actynolite, cited in 1833, probably from Osborne soapstone quarry.)

1835. **Tremolite** in rhombspar. Middlefield; also ligniform and compact asbestos.

E. Hitchcock: Geol. Mass., p. 363.

1835. **Actynolite**. Middlefield, Blandford, Zoar.

E. Hitchcock: Loc. cit.

1835. **Fasciculite** in talcose slate. Plainfield.

E. Hitchcock: Loc. cit.

1835. **Anthophyllite**. Pelham, in gneiss.

E. Hitchcock: Geol. Mass., p. 399.

I can not feel sure what mineral was intended here; probably the black hornblende, which occurs rarely in the gneiss.

1835. **Anthophyllite**. Chesterfield, with sappare (cyanite) and garnet; Chester, with pyroxene, garnet, and staurotide; Blandford, abundant.

In fibrous masses or imperfect prisms embedded in the mica-slate.

E. Hitchcock: Geol. Mass., p. 347; also, Final Report, 1841, p. 606.

1835. **Cummingtonite** (= epidote. Dewey.) Cummington and neighboring towns. Warwick.

E. Hitchcock. Ibid.

1835. **Cummingtonite**. Plainfield. Cummington.

Hemiprismatic wavelline spar. Full description and analysis by Muir. Columnar, ash-gray; H 6.5, gr. 3.2014:

SiO_2	56.543
FeO	21.669
Mn	7.802
Na_2	8.439
H_2O	3.178

C. U. Shepard: Min., Vol. II, Part I, p. 159.

1841. **Cummingtonite.** Cummington. In mica-slate.

"Dr. Thompson is decidedly of opinion that this mineral belongs to a new species allied to the karpholite."

E. Hitchcock: Geol. Mass., p. 607.

1841. **Actynolite.** Middlefield, Zoar, Blandford.

In talcose slate. Finest from Blandford; in talcose slate, fine fibrous hornblende. Fasciculite.

Ibid., p. 613.

1841. **Hornblende.** Chester.

"Near the chromite-of-iron locality, in the west part of Chester, a mineral occurs in talcose slate in indistinct prisms of a black color, which I shall call hornblende; but I should not be surprised if a more careful examination than I have found time to make should prove it to be acmite, which comes to us from Norway only."

Ibid., p. 614.

(This is the black radiated tourmaline in hexagonal prisms from the North mine and along the whole eastern selvage of the emery vein, which closely resembles hornblende, and was described by Shepard as tourmaline.)

1841. **Tremolite.** Middlefield.

In bitter spar in serpentine. Ligniform and compact varieties are found in the same steatite bed; also at Zoar, in talcose slate.

E. Hitchcock: Geol. Mass., p. 613.

1841. **Actynolite.** Westfield, in serpentine.

"Also a mineral which I am disposed to refer to anthophyllite." (This is enstatite.)

Ibid., p. 618.

1844. **Cummingtonite.** (*Augitus scopiformis.*) Cummington and Plainfield.

J. D. Dana: Sys. Min., p. 373.

1844. **Hornblende.** Chester; with obtuse edges truncated.

F. Alger: Min., p. 83.

1876. **Anthophylline.** Chesterfield, Pelham.

C. U. Shepard: Cat. of Min., within 75 miles of Amherst College, p. 5.

1878. **Cummingtonite.**

Iron magnesia amphibole.

J. D. Dana: Min., p. 234.

1885. **Hornblende.** Chester.

A fibrous black hornblende from near Chester, Mass.; affords an imperfect cat's-eye.

G. F. Kunz: Precious stones; in Min. Res. of U. S., 1885, p. 728.

"Some time ago there were a number of pieces sold in New York as coming from Chester, Mass. It was a fibrous hornblende, in fiber almost as fine as crocidolite. I think someone called it Bentonite."

G. F. Kunz: Private communication, Feb. 5, 1886.

1885. **Actinolite.** North Blandford.

In large quantity; fine, acicular, deep-green, and in all stages of change to steatite, at Bartholomew's quarry, North Blandford, and in still larger and finer masses at Osborne's quarry, near the middle of the same town. In granular masses of the finest emerald-green at the Pelham asbestos mine.

1890. **Cummingtonite.** Chesterfield.

The hair-brown hornblende, so long called anthophyllite, occurs in a highly pyritous rock associated with large garnets, and can be best obtained in the bluffs west of Bunnells Pond, in Chesterfield, and from large bowlders down the hill nearly a mile southeast of Chesterfield church.

1891. **Actinolite.** Pelham.

The new excavations have afforded the richest-colored deep-green actinolite, in long, fibrous, sheaf-like, and radiating masses.

1891. **Hornblende** changed to a mixture of epidote and chlorite. Chester.

Very attractive specimens were furnished abundantly from the first cut west of the Chester station, flat black blades penetrating a white granular quartzite forming a bed in the hydro mica-schist. This hornblende is at times altered into a mixture of granular epidote surrounded by a superficial layer of blackish-green chlorite. (See Epidote.)

1891. **Fasciculite** changed to biotite.

The "fasciculite" or radiating hornblende of the Charlemont "fasciculite schists" is at times changed into a dark-brown to black biotite, arranged in a series of overlapping scales about as broad as the cross-section of the thin blades of the original mineral.

1891. **Crocidolite.** Chester.

A pale-green, rigidly columnar mineral, breaking in rods about 4 inches long, was distributed in exchange by Professor Shepard under this name. It is a granular calcite-asbestos mixture, only a few fibers being left behind in acid. Under the microscope narrow, wavy bands of serpentine are seen to run through the mass.

AMPHODELITE.

See Oligoclase.

ANALCITE.

1818. **Analcime.** Deerfield.

Very abundant, associated with quartz and amethyst, which are sometimes inclosed in analcime; generally cylindrical, reniform, radiated, a few perfect crystals. One mile from Deerfield Academy, E. 2° 15′ S.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 114.

1818. **Analcime.** Deerfield.

Occurrence in secondary greenstone.

Review of Cleaveland's Mineralogy, by E. Hitchcock; Am. Jour. Sci., 1st series, Vol. I, p. 49.

1823. **Analcime.** Deerfield.

Usually in laminated or radiated masses which are reniform, cylindrical, or nearly spherical; very rarely in trapezoidal crystals; color white, gray, and flesh color. Associated with calcareous spar, quartz, chalcedony, etc., and frequently effervesces a little with acid.

E. Hitchcock: Geol. Conn.; ibid., Vol. VI, p. 224.

1835. **Analcime.**

Occurrence doubtful.

E. Hitchcock: Geol. Mass., small ed., p. 436.

1841. **Analcime.** Chester, in mica slate (Emmons).

E. Hitchcock: Geol. Mass., p. 606.

(It occurred in beautiful amber-colored crystals on fissures in hydromica-schist. There were fine specimens in the Shepard collection. I have not been able to recover the locality.)

1841. **Analcime.**

"Has been frequently said to be quite common, but I am suspicious that calcareous spar has been confounded with that mineral, and I dare not say that it exists in our greenstone."

E. Hitchcock: Geol. Mass., p. 662.

1876. **Analcite.** Chester.

C. U. Shepard: Cat. of Min., within 75 miles of Amherst College, p. 4.

1882. **Analcite.** Deerfield.

Occurred (*a*) in a single crystal upon prehnite; (*b*) in flat 8-sided plates, 10 to 12 mm. across, striated and formed by the growth of the trapezohedron in a narrow fissure; (*c*) in milk-white films circular and octagonal, 5 to 10 mm. across; (*d*) in extremely fine botryoidal surfaces with crystalline structure, with here and there a system of curious concentric depressed rings, like the siliceous annulations on some fossils (beckite). They are as if formed by pressing several rings, each smaller than the other, into a soft mass, so that it should rise as a series of thin concentric combs between them; (*e*) other pieces which seem to me to have been analcite of the form (*b*) are now wholly decomposed into a yellow ferruginous kaolin (?).

Associated with the analcite (*b*) and resting against the separate crystals on all sides is opaque white calcite $\frac{4}{5}$ R and 1^5, grouped in parallel clusters, the faces all rounded and the clusters looking as if they had been made of some soft material which had "run." This grouping of the calcite around the separate crystals of the analcite may explain the annulations mentioned above, the two minerals having increased alternately and the calcite afterwards having been removed.

B. K. Emerson: The Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 201

ANDALUSITE.

1885. **Chiastolite.** Whately, Mass.

The Whately argillite is changed on contact with the Hatfield tonalite (sienite) to a "garben schiefer" full of slender chiastolites above an inch long, but altered now to a mixture of muscovite and minute and perfect staurolite crystals. The chiastolite pseudomorphs still retain the black cross of coaly particles.

1890. **Chiastolite.**

For supposed chiastolites in the Trias, see Salt.

1893. **Chiastolite.**

"Crystals from Springfield" cited from Dana. (Sys. Min., 6th ed., 1892, p. 497.)

F. Becke: Tschermak Min. Mit., Vol. XIII, p. 257.

(The crystal is a common Lancaster crystal, which is said by Dana to have been "dissected by B. Horsford, of Springfield.")

ANDESITE.

1876. **Andesite.** Pelham.

Closely associated with a shining red-brown biotite in loosely aggregated scales. The andesite is in large highly crystalline individuals, and is intimately associated with similar individuals of corundumite, though the latter are of infrequent occurrence. (SiO_2, 57.20; CaO, 8.7.)

C. U. Shepard: Contributions to Min. (private publication), p. 4.

1883. **Andesite.** Pelham asbestos mine.

Sections cut from the specimen analyzed by Professor Shepard parallel to the axes gave extinction -4-5° on 0 P and -13-14° on $\infty P\breve{\infty}$, which agrees with andesite, or a form between andesite and labradorite. The compact specimens named by him andesite are mostly anorthite, and are distinguished from those named anorthite by him only in the presence of disseminated biotite. It is all well advanced in decomposition, being much dusted with muscovite. It contains zircon. Nearest the tourmaline the mass is finest grained, white, free from biotite, and nearly all anorthite; farther away the grain gets coarser and the andesite increases gradually. Its twinning bands are broad, equally thick, and continuous. Other egg-shaped masses in the massive biotite, but farthest from the central mass, were very fresh and limpid and often gave conchoidal fracture. They gave an extinction on P of -1.30, and were thus intermediate between andesite and oligoclase—an interesting gradation from the basic anorthite near the olivine to the oligoclase near the acid gneiss.

ANGLESITE.

1811. **Sulphate of lead.** Loudville.

In plates or tables on cubes of galena and in cavities in quartz.

William Meade: Bruce's Am. Min. Jour., Vol. I, p. 150.

1811. **Muriate or carbono-muriate of lead.** Loudville.

With description; very light green; groups of a cubic form terminated by tetrahedral pyramids; slightly affected by nitric acid.

William Meade: Bruce's Jour., Vol. I, p. 151.

1823. **Carbonated muriate of lead.** Loudville.

Same, above quoted.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 234.

1823. **Sulphate of lead.** Loudville.

Meade's description (1811) quoted.

E. Hitchcock: Geol. of Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 234.

1835. **Sulphate of lead.** Loudville.

Small plates on galena.

E. Hitchcock: Geol. Mass., p. 508.

1835. **Murio-carbonate of lead.** Loudville.

Same, above quoted.

E. Hitchcock: Geol. Mass., p. 507.

1835. **Corneous lead.**

C. U. Shepard: Min., Vol. I, Part II, p. 149.

Not mentioned in third edition.

1841. **Murio-carbonate of lead.** Loudville.

Previous account repeated.

E. Hitchcock: Geol. Mass., p. 705.

1841. **Sulphate of lead.** Loudville.

In small plates on galena.

Ibid., p. 705.

1865. **Phosgenite.** Southampton. Loudville.

Suggests that the stolzite here described by him under the name scheeletine may have been mistaken for cerasite (phosgenite or mendipite) or matlockite, one or the other of which, under the old name of muriate of lead, has been supposed to exist at this locality.

C. U. Shepard: On scheeletine; Am. Jour. Sci., 2d series, Vol. XLI, p. 215.

The above suggestion can not be accepted, because stolzite is decomposed by nitric acid. The original mineral described by Meade can not have been phosgenite, which dissolves with effervescence in dilute nitric acid. Almost all the points given in the description of Meade agree with anglesite. The crystals of anglesite found here are often superficially green from copper. It is described further as vitreous, nearly the luster of a precious stone, glassy fracture, brittle, melts to orange mass with lead globules, formed on galena, and but slightly acted upon by nitric acid. All these points agree with anglesite, and only the crystalline form remains; "in cubic form terminated by tetrahedral prisms." It will be noted further that no one has ever found the mineral since Meade's description, but all have copied him. I found in 1885 (in the Clark collection of Smith College, which has the finest series of crystals from the Loudville mine) specimens which agreed also in cystallization. They are an exceptional form of anglesite and appear in grouped prismatic aggregates up to 10 mm. in length, surmounted by acute pyramids, and resembling acicular aragonite. At times the aggregated prisms are finely striate longitudinally, changing the resinous luster to satiny. It is translucent, colorless to slightly amber.

A fragment of a crystal treated with HNO_3 was only slightly affected. Before the blowpipe it turns yellow, decrepitates, and with soda gives lead globules and test for sulphur.

1866. **Cotunnite.** Southampton lead mine.

Found in four specimens by Mr. P. W. Lyman; small groups lining quartz; right rhombic prisms, milk-white, opaque, soluble.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 247.

1885. **Anglesite.**

All the specimens upon which the above determination was made have passed through my hands, and are anglesite of very simple crystalline form. The best specimen—a large mass of quartz with many crystals—was burned with the Shepard collection. The second best piece has since been presented to the college by the finder, Rev. P. W. Lyman. Several other specimens are in the J. Clark collection of Smith College.

The following observations were made by me on the specimens presented by Rev. P. W. Lyman and determined by Professor Shepard, and also on others labeled by Mr. J. Clark as determined by Professor Shepard: Crystals in right rhombic prisms ∞P, $0P$—largest, $1\frac{1}{2}$ mm. long, $\frac{3}{4}$ mm. wide—scattered over the surface of quartz in cavities in quartz or cerussite; color snow-white, opaque. In a single instance the face of another prism appears about $\infty P \bar{2}$; base striated parallel to long diagonal; prisms horizontally striated; broken crystals show the interior to be translucent and of resinous luster; prism faces slightly barreled and composite, the larger

1885. **Anglesite**—Continued.

crystals at times grouped and radiating like stilbite; small crystals transparent at the ends; average of many varying measurements, I ∧ I, 76° 30′ (anglesite = 76° 16½′).

No trace of solubility could be detected. Chlorine and lead were tested for in vain in the water in which the crystal had been boiled; as also in the nitric-acid solution. Before the blowpipe it turns yellow, decrepitates; with soda gives globules of lead and strong test for sulphur.

ANKERITE.

1825. **Carbonate of iron.** Cummington.

At rhodonite locality; laminated masses; not large.

E. Hitchcock: Loc. Min.; Am. Jour. Sci., 1st series, Vol. IX, p. 22.

1825. **Carbonate of iron.** Plainfield.

Beautiful crystals; rhombs nearly white, curved faces.

J. Porter: Ibid., Vol. IX, p. 54.

1827. **Carbonate of iron.** Charlemont, Hawley, Chester.

J. Porter: Min. Not.; ibid., Vol. XII, p. 378.

1835. **Ankerite.** West Springfield.

See Dolomite.

1841. **Carbonate of iron.** Cummington.

In bowlders of manganese ore.

E. Hitchcock: Geol. Mass.; Final Rept., p. 613.

1892. **Ankerite.** Hawley, Charlemont.

The following analyses represent the composition of the carbonate so abundantly disseminated in the Hawley schists.

No. 1, by L. G. Eakins, of the United States Geological Survey, is from a chlorite-schist in which the coarsely granular carbonate is disseminated like the feldspar in a gneiss. It is from a point just south of the road running over Forge Hill, in Hawley, near the first mine in the pasture of M. V. Cressy.

No. 2, also by Mr. L. G. Eakins, is from quite large rhombohedra of the same mineral in chlorite-schist from the hill a mile north of the hotel in Charlemont.

No. 3 is by Mr. C. L. Upton, class of '91, in Amherst College, and is the mean of two analyses. It is from the fine large rhombohedra found in chlorite-schist in Hawley, in the gorge near the mill, opposite the town hall.

	No. 1.*	No. 2.	No. 3.
SiO_2	3.87	.67	3.77 †
Al_2O_3	2.72	Trace.	CaO 10.98 / MgO
Fe_2O_3	1.75	.08	1.23
FeO	1.34	7.60	7.40
MnO	.05	1.61	.....
CaO	3.34	28.63	27.62
MgO	4.50	16.17	15.87
K_2O	.19	(NiO .03)	.....
Na_2O	.15	.....	.....
CO_2	4.51	‡45.35	‡43.13
	22.82	100.14	100.00

* Soluble in HCl. † Gangue. ‡ Loss.

This gives for No. 2 the formula $CaCO_3+FeCO_3+2\frac{1}{2}(CaMgC_2O_6)$.

ANHYDRITE.

1892. **Anhydrite.** Northampton.

Larrabee's quarry, beside the Connecticut River, on the north line of Holyoke. A very exceptional and interesting occurrence of anhydrite has just come to my knowledge. Its geological significance will be discussed in the monograph on the geology of the area. Within a small space, a foot or two beneath the surface of the trap mass exposed in the quarry, the large irregular cavities in the trap, 1 to 2 inches thick and 3 or 4 inches in the other dimensions, are filled (instead of with calcite, as is usual) with the finest bluish anhydrite. It is in tabular masses, precisely like the Chesterfield cleavelandite.

The tabular aggregates are generally slightly radiated, and the plates reach 2 or 3 inches in length. They at times radiate so rapidly in smaller plates that the latter curve 90° in a single inch. The plates vary in width from an eighth of an inch down to extreme fineness, are bounded by nearly parallel planes, but taper slowly to an edge, and are replaced by the thickening of their neighbors. The planes bounding these plates are parallel to $\infty P\breve{\infty}$ (010). As a result of this structure a mass broken across the face of perfect cleavage 0 *P* (001) closely resembles in luster and habit the striated prism faces of apophyllite, the cleavage is so exceptionally perfect. It resembles even more closely the triclinic striation of albite when the latter structure is coarsely developed. Sections including several plates cut parallel to 0 *P* polarize as units and show the obtuse bisectrix.

Sections parallel to $\infty \bar{P}\infty$ (100) show the same partings and give the axial figure in the same position on all the bands; so there is no twinning.

Sections parallel to $\infty P\breve{\infty}$ (010) do not extinguish entirely. They show a decided cleavage parallel to $P\breve{\infty}$ (101), along which the mineral often separates readily.

One cavity showed traces of fibrous, finely striated crystals.

The surface of the outflowing trap sheet was covered with mud while still plastic, and trap and shale are confusedly mingled. There is much pyrite in the trap and much secondary calcite in the cavities, often with the anhydrite.

ANORTHITE.

1876. **Anorthite.** Pelham.

"Found abundantly at the asbestite mine of Pelham. Massive, granular to compact; color grayish, yellowish, or pinkish white. It is the indianin variety of the species and contains 19.4 of CaO."

C. U. Shepard: Contrib. to Min. (priv. pub.), p. 4, and Cat. of Min. within 75 miles of Amherst College, p. 5.

1876. **Anorthite.** Pelham.

The following analysis was made by Mr. Josiah Keep, of the class of '74, Amherst College: The material was taken from the opaque white, fine granular variety nearest the olivine rock. The specimen was one labeled anorthite by Professor Shepard:

SiO_2	48.87
Al_2O_3 (dif)	36.76
CaO	10.82
K_2O	1.35
Na_2O	2.20
	100.00

1882. **Anorthite.** Pelham. Asbestos mine.

Some well-formed small crystals occur implanted in tourmaline—albite twins with few faces.

1883. **Anorthite.** Pelham. Asbestos quarry.

The fine white compact mass nearest the tourmaline (Shepard's type) gives extinction in twin laminæ 25° to 38°, and so is probably anorthite. The crystals are almost simple, with very minute interspersed laminæ in two directions at right angles. It is much decomposed into muscovite, and carries zircon, and is mixed with andesite.

1892. **Anorthite.**

The feathery porphyritic groups of first consolidation in the diabase uniformly show the optical characters of anorthite.

ANTHRACITE.

1835. **Anthracite.** Turners Falls, in Gill; at the Southampton lead mine, in Triassic sandstone.

E. Hitchcock: Geol. Mass., p. 227.

1841. **Anthracite.** Above repeated.

E. Hitchcock: Geol. Mass., Final Rep., p. 137.

ANTHOPHYLLITE.

1818. **Asbestus.** Pelham.

Compact.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 114.

1823. **Asbestus.** Pelham.

With serpentine and talc.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 225.

1824. **Compact asbestus.** Pelham.

C. U. Shepard: Min. Loc.; ibid., Vol. VIII, p. 235.

1870. **Asbestus.** Pelham.

Land of Mr. Samuel Newell; recent excavations for economical purposes prove it inexhaustible.

J. H. Adams, class of '70, Amherst College: Am. Jour. Sci., 2d series, Vol. XLIX, p. 271.

1876. **Asbestite.** (Shepard.) Pelham.

Fibrous and hard; sp. gr., 2.9 to 3.

SiO_2	59.40
MgO	30.60
FeO	7.60
H_2O	1.56
Al_2O_3CuO	Trace.
	99.6

Compact and subslaty; sp. gr., 2.93.

SiO_2	58.91
MgO_2	29.37
FeO	9.37
HO	3.37
Al and Ca	Trace.
	100.92

C. U. Shepard: Min. Cont. (priv. pub.), p. 3.

1876. **Asbestite.** Pelham.

C. U. Shepard: Cat. Min., 75 miles of Amherst College, p. 3.

1877. **Asbestoid bronzite.**

After quoting the two analyses of "asbestite," given above, Shepard says, "They are both undoubted varieties of bronzite. The fibrous variety exactly resembles this species from Aloystha (Aloysthal), in Moravia, except in wanting the dark color and bronzy luster of the Moravian mineral and in having, through partial decomposition, a somewhat lower hardness. The peculiar oblique cross cleavage of the fibers from both localities is very strikingly similar. The common, coarsely granular bronze variety is also found in small quantity at Pelham, diffused through rounded masses of considerable dimensions of the peculiar mineral named by me Pelhamine. These masses are enfolded in the closely contiguous biotitic schist.

C. U. Shepard: Contrib. to Min., p. 4; Amherst, May 11, 1877.

1893. **Anthophyllite.** Pelham.

In the geological monograph the "asbestus" of the Pelham asbestos mine is discussed and its derivation from olivine established. This fibrous asbestiform mineral is a secondary one, being derived from the olivine rock and growing out from fissures which form a great network in the latter, in fibrous masses set transversely to these fissures which remain as central sutures to the new growth, so that the whole repeats on a large scale the microscopic decomposition of olivine. On the other hand, the bronzy mineral mentioned above by Professor Shepard is a true bronzite—an original constituent of the olivine-enstatite rock.

The fibrous mineral was proved to be anthophyllite by its uniform longitudinal extinction and by finding larger blades, measuring 54° 30′ to 55°.

1894. **Asbestus.** Pelham.

C. Hinze, p. 1231.

ANTIMONITE.

1822. **Sulphuret antimony.** Near South Hadley.

Cleaveland's Min., Vol. II, p. 688.

This occurrence has not been verified.

APATITE.

1824. **Phosphate of lime.** Chester.

In an aggregate of gray epidote, zoisite, hornblende, and quartz. Dissolves slowly in NO_5. Whitish-yellow. Fragments transparent. Form a rectangular prism.

E. Emmons: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VII, p. 254.

1824. **Phosphate of lime.** Chester.

Disseminated in granite. Also the variety apatite in yellowish-green crystals and granular masses phosphoresces on hot iron with pale-yellow light; also in mica-slate in roundish masses. Its powder digested in H_2O changes vegetable blue to green (Emmons).

C. Dewey: Geol. Berkshire Co.; ibid., Vol. VIII, p. 36.

1825. **Phosphate of lime.** Williamsburg.

"July, 1824. This mineral was forwarded to me in June last by Morris Dwight, its discoverer. It is embedded in a rock of gneiss. * * * Color delicate straw yellow, pale green, greenish white, apple green. Large 6-sided prisms more than 1 inch in length terminate by flat plane."

B. Silliman: Notice of a mineral supposed to be phosphate of lime from *west Massachusetts*; Am. Jour. Sci., 1st series, Vol. IX, p. 174.

1827. **Asparagus stone.** Williamsburg, in granite.

Prisms several inches long; and another variety of phosphate of lime in mica-slate in grains.

A. Nash: Lead mines of Hampshire County; ibid., Vol. XII, p. 260.

1835. **Apatite.** Williamsburg, Chesterfield, Chester, Middlefield, Norwich, Conway.

In Williamsburg, hexagonal, delicately green crystals; in Norwich, in gray quartz and black mica near granite. One crystal 6 inches long by 3 inches across.

E. Hitchcock: Geol. Mass., p. 343.

1841. **Apatite.** Williamsburg, Chesterfield, Chester, Middlefield, Norwich.

Williamsburg, hexagonal, delicately green; Chesterfield, with kyanite. Resembles chrysoberyl in appearance. Norwich, in gray quartz, with black mica, near granite. One imperfect crystal (No. 728, State collection) 3 inches in diameter, 6 inches long.

E. Hitchcock: Geol. Mass., p. 604.

1844. **Apatite.** (*Fluellus hexagonus.*) Norwich, Chester, Chesterfield, and Williamsburg.

J. D. Dana: Sys. Min., p. 238.

1876. **Apatite.** Pelham, Huntington.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 2.

1879. **Apatite.** Walnut Hill, Huntington.

In tourmaline granite veins.

A. A. Julien: Ann. N. Y. Acad. Sci. Arts, Vol. I, p. 352.

1883. **Apatite.** Pelham asbestos quarry.

An exquisite 6-sided prism one-half inch long, green at ends and down middle apparently, but satiny white on faces, and with plumose surface. Given me by Mr. Thompson for mineral collection of Amherst College.

1885. **Apatite.** Rowe.

Small light-green crystals in pyrites at the mine of J. M. Davis & Co.

A. G. Dana: Gahnite at Rowe; Am. Jour. Sci., 3d series, Vol. XXIX, p. 455.

1891. **Apatite.** Pelham.

The new working of the asbestos mine has furnished many beautiful crystals. They are embedded in the biotite fringe rock, with nodules of hornblende and corundum, and in the massive tourmaline. They are transparent, rich oil-green. The form is a short, stout prism with flat ends. The largest was 3 inches long and 2 wide, showing the faces ∞P, 0 P, P, ∞ P 2. Some are weathered through and through to opaque white, like the Suarum crystals.

1895. **Apatite.** Chester.

Occurs in small, pale-green crystals with corundophyllite, in the Chester emery vein.

ARAGONITE.

1825. **Aragonite.** Middlefield.

Yellow, transparent. H. = 4; sp. gr., 2.39. Dissolved in nitric acid with effervescence. Exactly resembled the Bilin crystals, with rhombspar in steatite, found by Dr. Emmons.

C. U. Shepard: Bost. Jour. Phil., Vol. III, p. 609. (The sp. gr. changed to *3.93 in Professor* Shepard's copy of the Journal.)

1887. **Aragonite.** Chester emery mine.

Beautiful crystals, of the usual acicular type and 20 mm. long, occur coating fissures; also in radiated tufts; the best specimens in the cabinet of the late Mr. Ames, of Chicopee.

ARSENOPYRITE.

1823. **Mispickel** (arsenical iron?). Gill.

Bowlder of several pounds. Dr. Alpheus Stone.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 232.

1876. **Arsenopyrite.** Bernardston.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 8.

[Probably exists only in bowlders.]

ASBESTOS.

See Anthophyllite and Amphibole.

ASTROPHYLLITE.

1866. **Astrophyllite.** Northfield.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 248.

See Biotite.

AUTUNITE.

1835. **Uranite.** Chesterfield, Mass.

At tourmaline vein. Crystalline plates and pulverulent. Emerald green (Mr. Shepard).

Ed. note: Am. Jour. Sci., 1st series, Vol. XXVIII, p. 382.

1841. **Uranite.** Chesterfield.

Found by Professor Shepard in small quantity.

E. Hitchcock: Geol. Mass., p. 704.

1841. **Uranite.** Chesterfield.

J. E. Teschemacher: Proc. Bost. Soc. Nat. Hist., Vol. I, p. 15 (abstract); Bost. Jour. Nat. Hist., Vol. IV, p. 35.

1844. **Uranite.** (*Uranalus quadratus*). Chesterfield.

Discovered by Teschemacher in centers of red tourmalines.

J. D. Dana: Min., 2d ed., p. 297.

1845. **Uranite.** Chesterfield.

Prof. C. U. Shepard claims priority over Teschemacher of discovery of uranium at Chesterfield.

Am. Jour. Sci., 1st series, Vol. XLVIII, p. 179.

1845. **Uranite.** Chesterfield.

Maintains claim to priority of discovery of uranite on ground that the publication of the Proceedings of the Boston Society of Natural History was April, 1841; that of Professor Hitchcock's Geology of Massachusetts, to which Shepard refers, was in November, 1841.

J. H. Teschemacher: Am. Jour. Sci., 1st series, Vol. XLVIII, p. 395.

1868. **Autunite.** Chesterfield.

In minute crystals on the quartz or albite, and sometimes in the red centers of tourmalines.

J. D. Dana: Min., p. 587.

1879. Autunite. West Chesterfield.

On cleavage planes of spodumene, derived from alteration of zircon containing uranium.

A. A. Julien: Spodumene and its alterations; Ann. N. Y. Acad. Sci. Arts, Vol. I, p. 354.

AXINITE.

1819. Augite. Deerfield.

"In an aggregate of greenstone, quartz, and calcareous spar in the greenstone range of Deerfield. Color black, and the crystals usually imperfect or broken."

E. Hitchcock: Supp. Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. II, p. 436.

1823. Augite. Deerfield.

In irregular veins or imperfect crystals.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 225.

1835. Augite. Deerfield.

"Is of an iron-black color and in imperfect crystals or in veins; is sometimes met with in the tufaceous greenstone of the Connecticut Valley, as at a spot 1 mile east of the village of Deerfield."

E. Hitchcock: Geol. Mass., p. 435.

1841. Augite. Deerfield.

Same as 1835.

E. Hitchcock: Final Report on Geol. Mass., p. 661.

1882. Axinite. Deerfield; cut on canal railroad. South of the Deerfield River, at Cheapside.

Jet-black opaque crystals, the largest 10 to 12 mm. in length, embedded in prehnite, and calcite resting on prehnite. The crystals are thick plates, resembling, as do many of the minerals found here, the simpler forms from Bourg d'Oisins—the faces $'P\infty$ $(1\bar{1}0)$, and $P'\infty$ (110), large and striated vertically, and $'P\infty$ striated horizontally parallel to the intersection edge of $'P\infty$ and $'P$ $(1\bar{1}1)$. The face $'P$ is smaller and striated horizontally. Rarely the faces $\infty P\breve{\infty}$ (010), $\infty P\bar{\infty}$ (100), and $2P\bar{\infty}$ (201) appear. Two very distinct distant cleavages, especially clear under the microscope, parallel to the two striations upon $'P$, and nearly at right angles to this face, thus nearly cubical. Thin splinters show brilliant trichroism, deep bottle-green, plum-blue, and clove-brown, and are glassy and easily transparent under the microscope, and entirely free from all impurities. The mineral has occurred also at the old locality east of Deerfield village, and appears in the State collection, Nos. 86, 87, labeled "Black augite in greenstone, Deerfield." I found also opposite Turners Falls a single perfect crystal 4 mm. long, black, with shade of brown, resting upon a botryoidal layer of diabantite in an amygdule. Some of the finest crystals of axinite occur in the datolite. The crystals are here sometimes short, stout prisms.

B. K. Emerson: The Deerfield Dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 350.

AZURITE.

1881. Azurite. Leverett.

With malachite in small portions, at new opening of upper Leverett mine.

1887. Azurite. Southampton lead mine.

Occurs surrounding chalcopyrite and intermixed with massive black copper oxide, also in thick coatings on quartz. Rare. Specimens in Clark collection of Smith College.

1890. **Azurite.** Chester.

In hornblende-schist at the main shaft of the emery mine.

BABINGTONITE.

1892. **Babingtonite.** Buckland.

Coating vertical north-and-south fissures in Cambrian gneiss at quarry beside railroad, near Shelburne Falls.

Broad surfaces are covered with a jet-black granular layer, which at times shows crystal faces. Dissolving away a layer of calcite, small crystals were exposed, with strongly striated faces of high luster, and having entirely the habit of babingtonite. The minuteness of the crystals and the striation prevented accurate measurement, but the following numbers were obtained:

	Found.	*Calc.*
c∧d	56°	57° 36′
c∧M	87° 10′	87° 28′
c∧m	67° 20′	67° 48′
c∧g	47° 20′	47° 36′

c=(001) 0 P d=(2$\bar{2}$1) 2 'P.
M=(1$\bar{1}$0) ∞ 'P m=(110) ∞ P'.
g=$\bar{1}$11 P.

c, g, and m are striated parallel to their intersection; d and M the same.

The following analysis was made in the laboratory of the Survey by Mr. E. A. Schneider. The material was in part brownish from the beginning of decomposition, which explains the large per cent of water:

SiO_2	52.48
TiO_2	Trace.
Al_2O_3	1.93
Fe_2O_3	[1]23.24
FeO	[2]
MnO	.37
MgO	1.55
CaO	19.31
K_2O	[3]
Na_2O	[3]
H_2O (105°)	.11
H_2O (above 105°)	1.03
P_2O_5	[3]
B_2O_3	[4]
	100.02

The mineral is intergrown with fine, small crystals of epidote, natrolite, chabazite, and quartz. The development of the faces is such that the crystals resemble axinite. On discussing the analysis Prof. F. W. Clarke pronounced the mineral babingtonite.

BARITE.

1810. **Barite.** From Southampton lead mine.

B. Silliman: Bruce's Min. Mag., Vol. I, p. 64.

[1] Includes FeO.
[2] Not determined, owing to lack of material.
[3] Not determined.
[4] Spectroscop. good reaction.

1818. Barite. Greenfield.

Bank of Connecticut River; walls of copper vein, 1 inch to 1 foot on wall; vein, 6 to 8 feet.

E. Hitchcock: Geol. Deerfield, etc.; Am. Jour. Sci., 1st series, Vol. II, p. 115.

1822. Barite. Hatfield, Mass.

Sp. Gr., 4.28.

BaO	58.50
SO_3	29.83
SiO_2	4.00
Al_2O_3	2.00
H_2O	3.00
	97.33

Dr. Gorham: Cleaveland's Min., Vol. I, p. 137.

1823. Barite. Hatfield (Gorham), Middlefield (Eaton). Southampton, Leverett, Greenfield copper vein—in all lamellar.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 211.

1827. Barite. Leverett.

Vein in granite 1 mile northwest of meetinghouse on land of Mr. Field; 1½ miles south on an eminence of granite; Hatfield, one-half mile west of town, vein in sienite; Williamsburg, east part; Whately.

A. Nash: Lead mines of Hampshire County; Am. Jour. Sci., 1st series, Vol. XII, p. 249.

1832. Barite.

"I have been in the habit for several years of having various articles in the laboratory covered with it, and it answers a good purpose. Mixed with boiled linseed oil and lampblack, it is superior to anything I have found for labeling glass bottles in the laboratory."

E. Hitchcock: Geol. Mass.; Am. Jour. Sci., 1st series, Vol. XXII, p. 48.

1841. Baryta. Southampton, Leverett.

Abundant in granite, in veins.

E. Hitchcock: Geol. Mass., p. 700.

1885. Barite.

Other localities of barite are many small veins in granite in field north of South Leverett lead mine, and at the railroad cutting south of the crossing east of the same mine.

1885. Crystallized quartz. Quartz pseudomorph after barite. Norwich (Huntington).

The specimens labeled crystallized quartz, XIX 204–209, in the State geological collection now at Amherst College, from Angel's mine, are pseudomorphs in plates 1 to 3 inches square.

1885. Barite. Titan's Piazza, Mount Holyoke.

Members of the class of '85 of Amherst College found quartz pseudomorphs after barite in much fissured amygdaloidal rock from the upper portion of the great diabase sheet, in masses fallen from the cliffs above Titan's Piazza. The barite had coated the fissures on both surfaces with a drusy layer about 3 mm. thick, made up of tabular crystals 1.5 mm. across. The cavity was then filled with slightly amethystine radiating quartz, and later the barite was itself replaced by quartz. The crystals are tabular 0 *P* (001), *P* $\breve{\infty}$ (101), *P* $\bar{\infty}$ (011). The rough faces gave only approximate measurements: 0 *P* ∧ *P* $\breve{\infty}$ 51°–53°, calculated 52° 43′; 0 *P* ∧ *P* $\bar{\infty}$ 57°, calculated 58° 10′.

1886. **Barite.** Northampton.

At granite quarry, south of W. N. Moore's, east of Florence, (1) in broad, large, and extremely thin crystals; pseudomorphs of quartz after barite; (2) in thicker incrustation pseudomorphs, also quartz after barite; and (3) compact barite, filling fissures 10 to 20 mm. wide.

1878. **Barite.** Florence, Northampton.

In veins in granite at the bridge and dam south of the brush factory.

1892. **Barite.** Northampton.

Larrabee's quarry in diabase on the Connecticut River Railroad above Holyoke.

The calcite filling fissures contains cavities from which thin tabular crystals of barite an inch square have been removed.

BASTITE.

1821. **Talc.** Russell.

A dark-colored serpentine containing scales of talc. Specimen sent by Dr. William Atwater.

Am. Jour. Sci., 1st series, Vol. III, p. 238.

1824. **Metalloidal diallage (?).** Middlefield.

In serpentine.

C. Dewey: Geol. Berkshire County; Am. Jour. Sci., 1st series, Vol. VIII, p. 49.

1825. **Schiller spar.** Blandford.

In serpentine, associated with anthophyllite. Shining folia olive to black. (The anthophyllite is enstatite.)

C. U. Shepard: Bost. Jour. Phil. and Arts, Vol. III, p. 608.

1832. **Green talc.** Russell.

E. Hitchcock: Geol. Mass.; ibid., Vol. XXII, p. 30.

1832. **Kerolite.** Blandford.

A leek-green and blackish-green variety in curved and stellular laminæ engaged in schiller spar.

SiO_2	40.0
MgO	41.4
CaO	0.932
FeO	2.70
H_2O	15.67
	100.702

C. U. Shepard: Min., Vol. I, Part II, p. 292.

1835. **Schiller spar (?).** Blandford.

Bowlders in the eastern part of Blandford, of a peculiar green serpentine, contain talc and schiller spar.

E. Hitchcock: Geol. Mass., p. 369.

1835. **Schiller spar.** Blandford.

C. U. Shepard: Min., Vol. II, Part II, p. 177.

1841. **Schiller spar.**

"The dark-green schiller spar found in serpentine in Blandford, Westfield, Russell, occurs in foliated masses."

E. Hitchcock: Geol. Mass., p. 618.

1841. **Schiller spar.**

The serpentine, as well as the schiller spar, is almost black, while the talc is green and somewhat brittle. Occurs only in Blandford, Russell, and Westfield.

Ibid., 1841, p. 615.

1844. **Schiller spar.** Blandford and Westfield.

F. Alger: Phillips, Min., p. 95.

1852. **Marmolite.** Blandford.

Dark-green variety.

C. U. Shepard: Min., Vol. I, Part II, p. 292.

1871. **Bastite.** Russell.

Optical axial angle 30°.

G. Tschermak: Ueber Pyroxene und Amphibole; Tschermak's mineral. Mittheil., Vol. I, p. 20 (4).

1876. **Serpentine.** Variety, marmoline. Russell, Blandford.

[Schiller spar not mentioned.]

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 3.

1876. **Phaestine.** Pelham.

On labels by Professor Shepard in Shepard collection, Amherst College. It is altered bronzite in black chrysolite rock from the asbestos mine.

1885. **Bastite.** Russell.

The blackish portions of the Russell serpentine from Atwater's quarry are in part still enstatite, in part are optically bastite, colored black by magnetite, and the latter portions do not differ from the leek-green plates first called marmolite by Shepard, except in the presence of disseminated magnetite in the former and its absence in the latter.

BERYL.

1813. **Emerald.** Chesterfield.

Dr. J. F. Waterhouse says crystals in hexagonal prisms, from an ounce and under up to 6 pounds, are found in granite. They occur up to a foot in diameter; color, light-green. He got 70 pounds.

Dr. Bruce: Bruce's Jour., Vol. 1, p. 264.

1813. **Emerald.** Vicinity of Northampton and Goshen.

"Found by that indefatigable mineralogist, Dr. David Hunt."

Ibid.

1819. **Emerald.** Chesterfield.

Crystals 3 to 5 inches long and 3½ inches in diameter; summit, a plane without additional facets, is perfect.

Col. G. Gibbs: On tourmalines, etc., at Chesterfield; Am. Jour. Sci., 1st series, Vol. I, p. 348.

1819. **Emerald.** Goshen.

Beautiful pale-rose, rather more transparent than the emerald.

Ibid., p. 351.

(This is the first mention of the "goshenite.")

1822. **Beryl.** Chesterfield.

Up to 1 foot in diameter, usually light-green (Bruce's Min. Jour.) Goshen. Two rose-colored emeralds are now in the cabinet of Colonel Gibbs; perfect crystals 1 to 1½ inches in length, 1 to 1¼ inches in diameter, one truncated on lateral edges. (Gibbs.)

Cleaveland: Min., p. 344.

1823. **Beryl.** Chesterfield and Goshen (Gibbs).

At Chesterfield the crystals are sometimes from 9 to 12 inches in diameter. At Goshen some are rose-colored.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 222.

1824. **Beryl.** Near Goshen Center.

Found with white augite on north road from Goshen Center, more than 1 inch in diameter.

Ibid., Vol. VII, p. 30.

(The "white augite" is spodumene.)

1824. **Beryl.** Norwich, Chester.

One-half mile west from Pitchers Bridge, Norwich (now Huntington), near mass of white rocks to be seen from the bridge; one crystal 5 inches in diameter and crossed by another at 45°.

Chester, in aggregate of carbonate of lime, chlorite, and feldspar. Yellowish-green to white.

E. Emmons: Min. Loc.; Am. Jour. Sci., 1st series, Vol. VII, p. 254.

(The second citation is problematical. This aggregate occurs at the emery mine associated with long, yellowish-green prisms of epidote.)

1824. **Beryl.**

Six-sided prisms and amorphous. Often fine, delicate green; up to 5 inches in diameter. In granite in Chester and Norwich (Emmons). Also in similar and larger crystals in Worthington, sometimes whitish.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 43.

1825 **Topaz (?).** Goshen.

"Portion of a crystal nearly an inch in diameter, perfectly limpid, although when lying in its bed it has a delicate green tinge which is occasioned by the greenish crystals of mica which lie around. Fracture in one direction straight, in others conchoidal."

E. Hitchcock: Ibid., Vol. IX, p. 180.

(Afterwards called goshenite.)

1825. **Pyrophysalite.**

"Dr. Wright, of Goshen, pointed out to me a mineral at the locality of indicolite, etc., which he informed me was denominated by Mr. Nuttall the variety of topaz described by mineralogists under the above name. Its color is white, tinged with green, and on hot iron it phosphoresces very distinctly with a yellowish-green light and loses its color. It is opaque, or only slightly translucent. It is distinctly crystallized, but from the few specimens I obtained I could not determine the form."

E. Hitchcock: Loc. Min., Am. Jour. Sci., 1st series, Vol. IX, p. 21.

(Afterwards called goshenite.)

1825. **Iolite (?).** Goshen.

From the Barrus locality. Full description given.

C. U. Shepard: Bost. Jour. Phil. and Arts, Vol. III, p. 395.

1825. **Beryl.** Norwich (Huntington). In the north part of the town.

In granite, a locality extraordinary for the regularity, transparency, and fine green color of the crystals, which occur from one-fourth to 4 inches in diameter. One superb crystal found in the earth near by 4½ inches in diameter and 6 inches long, with smooth and brilliant faces and rich green color.

C. U. Shepard: Bost. Jour. Phil. and Arts, Vol. III, p. 607.

(This crystal was destroyed with the Shepard collection.)

1827. **Beryl.** Goshen, Chesterfield.

In granite veins, 2 to 3 inches in diameter and 5 to 6 inches long.

A. Nash: Lead mines of Hampshire County; ibid., Vol. XII, p. 259.

1828. **Beryl.** Norwich (now Huntington).

"Sought location" one-half mile west of Pitchers Bridge, near mass of white rocks to be seen from the bridge, described in Robinson's Catalogue.

No such white rocks can be seen west of the bridge, but a conspicuous, protruding mass of granite to the north; in this only one or two crystals of beryl occurred. It appeared also near the north line of the town.

E. Hitchcock: Min. Ex.; Am. Jour. Sci., 1st series, Vol. XIV, p. 219.

1835. **Beryl.** Chesterfield.

One foot in diameter.

E. Hitchcock: Geol. Mass., p. 506.

1838. **Phenakite.** Goshen.

"My first knowledge of the American mineral, which I take to be phenakite, was acquired about fourteen years ago, during a visit to the tourmaline locality in Goshen (on the farm of Mr. Weeks) in company with Mr. Nuttall and the late Dr. Hunt, of Northampton. My first impression was that it belonged to iolite, an opinion I afterwards changed in favor of the species beryl, under which name, I believe, it has generally passed in cabinets ever since. It should be remarked, however, that it was referred by some collectors for a time to topaz." Described.

C. U. Shepard: Am. Jour. Sci., 1st series, Vol. XXXIV, p. 330.

(Afterwards called goshenite.)

1841. **Beryl.** Pelham.

In gneiss in Pelham; a rather handsome yellow beryl; not abundant.

E. Hitchcock: Geol. Mass., p. 638.

1841. **Beryl.** Goshen, Chesterfield, Norwich.

"Many localities which yield few and not rich specimens." Several places in Goshen.

At the Weeks farm occurs a mineral of a rose color, but usually hyaline, which was formerly described as a rose beryl. Professor Shepard has, however, more recently described this mineral as the phenakite.

Am. Jour. Sci., 1st series, Vol. XXXIV, p. 330.

Dr. F. Tamnau, of Berlin, Prussia, to whom I sent specimens, says that "it seems not to be identical with the phenakite from the Ural and from Tramont [Framont], and I wish particularly to have more of it for a chemical analysis."

Chesterfield and Norwich. Beryls of great size, but poor; Norwich. In northwest part, very good; in Williamsburg and Worthington, quite elegant; also Warwick.

E. Hitchcock: Geol. Mass., p. 703.

1842. **Phenakite.** Goshen.

"A new examination of the sp. gr. satisfies me that it is not phenakite; sp. gr., 275-276, too low for phenakite; slightly superior to beryl, also slightly harder."

C. U. Shepard: Am. Jour. Sci., 1st series, Vol. XLIII, p. 366.

1844. **Goshenite.** Goshen.

C. U. Shepard: Treatise Min., 2d ed., Part I.

1844. **Beryl.** (*Beryllus hexagonus.*) Goshen and Chesterfield.

J. D. Dana: Sys. Min., p. 393.

1845. **Goshenite.** Goshen.

"I agree that goshenite, in the absence of well-determined crystals, rather than for the want of a good analysis (as you suggest), occupies a precarious position among my list of species."

C. U. Shepard: Reply to critique on mineralogy; Am. Jour. Sci., 1st series, Vol. XLVIII, p. 174.

1845. **Goshenite.** Goshen.

"A crystal of this substance lately obtained by me at the locality shows so nearly the angles of beryl as to remove all probability that these minerals can be shown to be crystallographically distinct."

C. U. Shepard: Various mineralogical notices, ibid., p. 176.

1854. **Goshenite.** Chesterfield.

Analysis proved it to be beryl.

J. W. Mallet: Am. Jour. Sci., 2d series, Vol. XVII, p. 180.

1866. **Beryl.** Northfield.

One mile northeast of village, on land of Simeon Lyman. In vein of graphic granite in mica-schist. Abundant crystals up to 10 inches. Pale greenish-white; tabular, ∞ P, 0 P.

Also on Northfield Mountain on road to Irving, in southeast corner of the town.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 248.

1876. **"Berylite.** Variety, aquamarine. Chesterfield; rose-colored and white. (Goshenin) Goshen."

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College.

In this publication Professor Shepard proposed a new nomenclature. The termination *in* was to be used for varieties not yet established as valid, *ine* for good varieties, *ite* for species. The system has not been adopted.

1877. **Beryl.** Blandford.

Dark-colored and poor. Field north of church.

1879. **Beryl.** Chesterfield.

At spodumene location, Barrus farm, near Goshen. Small green crystals in coarse masses at Chesterfield Hollow.

A. A. Julien: Ann. N. Y. Acad. Sci. Arts., Vol. I, p. 319.

1882. **Beryl.**

Fine crystals have been found by Mr. J. T. Ames, of Chicopee, in the granite veins in the Monson quarry.

Mr. W. N. Flint, private communication.

1882. **Beryl.** Blandford.

A fine crystal 16 inches long and 12 inches in diameter was obtained at the feldspar quarry of the Pontoosuc flint mills and presented to the Amherst College cabinet by Mr. F. L. Nason.

1882. **Beryl.** Northfield.

In Brush Mountain at tourmaline locality. Crystals up to 3 inches across, bluish, oil-green to colorless; largest 13 inches across, 78 to 80 pounds; 0 P, ∞ P. In some the prisms are molded into points at one end by intercrystallization with muscovite. Also found at columbite locality at John Moody's and east of gulf road, in granite. Discovered by Mr. M. A. Brown.

Collection of W. E. Webster, Northfield.

1885. **Beryl.** Huntington, Norwich Hill.

In extensive blasting at the spodumene ledge, done for me by Mr. F. L. Nason, only a few small prisms and irregular pieces were found, molded among other minerals. Of a reddish-yellow color.

1890. **Beryl.** Goshen.

Rude crystals more than a foot across, in granite north of the brook entering Lily Pond. Discovered by Mr. Alvan Barrus.

1890. **Beryl.** Goshen.

Two beautiful rose-colored beryls, over an inch across, have been found at Goshen, Mass., and are in the Gibbs cabinet at Yale University.

George F. Kunz: Gems and precious stones of the United States, p. 92.

BIOTITE.

1823. **Macle.** Chesterfield.

"According to Mr. Nuttall, the foliated mineral occurring so abundantly in the mica-slate in Chesterfield, etc., being usually inserted in small bronze-colored plates nearly at right angles to the bedding, may be macle."

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 227.

1824. **Black mica.** Pelham.

Fine specimens.

C. U. Shepard: Min. Loc., ibid., Vol. VIII, p. 235.

1838. **Black mica.** Brimfield.

Six-sided tables with iolite, good; 1½ miles northeast of village, on Warren road, near Samuel Patrick's.

J. W. Foster: Ibid., Vol. XXXIII, p. 400.

1841. **Mica.**

Described as a constituent of "spangled mica-slate," with expression of uncertainty as to its nature. Small bronze plates at right angles to bedding; brittle and inelastic.

E. Hitchcock: Geol. Mass., p. 594.

1852. **Ottfelite.** Near Goshen.

Abundant.

C. U. Shepard: Min., p. 161.

(This is the biotite forming the spangles of the "spangled mica slate.")

1866. **Astrophyllite.** Northfield.

"Black-lead mine," on land of Mr. Piper.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 248.

(It is not cited in Shepard's Catalogue of Minerals of 1876, and is biotite. See 1886. Graphite, under GRAPHITE.)

1866. **Biotite.** Chester.

"I examined a specimen of the dark-green micaceous mineral which I took to be chlorite (the corundophyllite of Shepard), and from its purity expected to get a very accurate idea of its composition, but in the very commencement of the investigation it was found to be well-characterized biotite." Occurs on surface of indianite (Shepard) in small, thin, micaceous crystals perpendicular to surface; dark green.

1866. **Biotite**—Continued.

Analysis.

SiO_2	39.08
Al_2O_3	15.38
MgO	23.58
FeO	7.12
MnO	0.31
K_2O	7.50
Na_2O	2.63
H_2O	2.24
Fl	0.76
	98.60

J. L. Smith: Am. Jour. Sci., 2d series, Vol. XLII, p. 91. This is the "fringe rock" mica afterward named euchlorite b Shepard.

1868. **Phyllite** (Ottrelite). Goshen, Plainfield, Chesterfield.

Dana, Min., p. 506.

1870. **Corundophyllite.** Pelham.

Inclosing corundum, at the asbestos mine.

J. H. Adams, class of '70, Amherst College. Am. Jour. Sci., 2d series, Vol. XLIX, p. 271.

(This is biotite, and is optically negative, with decided biaxial character.)

1876. **Euchlorite** (Shepard). Chester.

Occurs in a layer several inches thick on both sides of an extensive vein of albite (should be oligoclase) 6 to 12 inches thick—"fringe rock." Description given.

Analysis.

SiO_2	35.51 to 38.46
FeO	15.52
Al_2O_3	6.80
HO	6.10
MgO (dif.)	38.07
	100.00

C. U. Shepard: Contrib. to Min., p. 2 (sep. pub.).

1876. **Ripidolite** (Clinochlore). Pelham.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 4. (Refers to the above citation.)

1876. **Euchlorite** (Shepard). Chester.

Un seul axe négatif comme les biotites. Cette composition étant celle d'un mica magnésien comme la biotite du Vésuve; l'euchlorite de M. Shepard n'est point une espèce particulière, mais une simple variété de mica.

Analysis.

SiO_2	39.55
FeO	7.80
Al_2O_3	15.95
MgO	22.25
Alkali	10.35
H_2O (loss)	4.10
	100.00

M. F. Pisani: Comptes Rendus, Vol. LXXXIII, p. 166.

1876. Biotite.

Great sheets, larger than one's hand, of jet-black shining biotite occur in coarse granitoid portions of the gneiss of the Monson quarry.

1876. Ottrelite. Chesterfield.

A slide of the "spangled mica-schist" is included in the series of slides to illustrate rock-forming minerals, sold by Prof. A. A. Julien and labeled ottrelite.

1887. Biotite. Goshen.

The so-called ottrelite or phyllite of the spangled mica-schist is optically uniaxial, negative, has the brown absorption colors, and all the properties of biotite. It occurs abundantly in the "calciferous mica-schist" (the Conway schists) and in the Devonian schists at Bernardston in small, elongate crystals set transversely to the foliation, as a result of later pressure. It shows abundant gliding planes from pressure, and is inelastic only when weathered. It is loaded with coaly matter and other impurities in the center and is free from inclusions in the outer portion.

1891. Biotite. Buckland.

In fine, large crystals in coarse granite south of Harris's soapstone quarry.

1892. Biotite. Pelham.

The wide fringe of deep bronze-colored biotite in aggregated scales surrounding the mass of olivine rock at the asbestos mine is discussed in the monograph on the area.

1892. Phyllite (under Ottrelite). "Goshen, Chesterfield, Plainfield, etc."

The mica of the spangled mica-schist is still retained in this relation, and reference is made to the fact that Wolff has found a similar mica in the Hoosac schists to be in part ilmenite.

E. S. Dana: A System of Mineralogy, p. 642.

1895. Biotite. Goshen.

The following analysis was made on material carefully selected by me from a typical specimen of the "spangled mica-schist" from the northern part of Goshen. The analysis was made in the laboratory of the Survey by Mr. George Steiger. The water determination was made by Dr. Arthur J. Hopkins, of Amherst College.

SiO_2	36.96
TiO_2	.91
Al_2O_3	21.15
Fe_2O_3	2.80
FeO	*15.54
CaO	.23
MgO	7.87
K_2O	7.47
Na_2O	1.00
H_2O	2.93
	96.86

* Determination unsatisfactory, owing to the large amount of insoluble residue.

BITUMINOUS COAL.

1835. **Bituminous coal.** Sunderland, South Hadley, West Springfield.

In coarse, gray, micaceous sandstone and in bituminous shale and "marlite." The question of finding coal in workable quantity is discussed at length.

E. Hitchcock: Geol. Mass., pp. 43, 227.

1841. **Bituminous coal.** Sunderland, at Whitmores Ferry. In the north part of South Hadley.

On the north bank of the Westfield River, in West Springfield, at "Mitneag" (now Mitaneague) Falls. It occurs in the form of small and irregular veins, the coal also being filled with numerous thin veins and crystallizations of calcareous spar.

Analysis.

Volatile matter (water and bitumen)	22.00
Carbon	77.97
Earthy residuum	0.03
	100.00

E. Hitchcock: Geol. Mass., p. 138.

BORNITE.

1823. **Variegated pyritous copper.** Montague.

Sparingly disseminated in calcareous spar in sandstone of the coal formation. Island at Turners Falls.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 231.

1825. **Purple copper.** Chesterfield.

With green feldspar.

C. U. Shepard: Min. Loc.; Am. Jour. Sci., 1st series, Vol. IX, p. 48.

1841. **Variegated copper ore.** Chesterfield.

Is said to have been found in the Chesterfield granite.

E. Hitchcock: Geol. Mass., p. 704.

1891. **Bornite.** Charlemont.

Back of S. G. Turner's house in chlorite-schist, disseminated in grains as large as a pea. (Hawley.)

Near C. Colby's house. Large grains, an inch across, surrounded by malachite. One specimen in cubes. In quartz veins in chlorite-schist. A pit has been dug, and the ore is said to assay $6 per ton gold, $2.50 silver.

BREUNNERITE.

1844. **Breunnerite.** See Dolomite.

BROOKITE.

1865. **Brookite.** Chester.

"Rarely attends diaspore and corundophyllite."

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XL, p. 123.

1865. **Brookite.** Chester.

A few crystals with diaspore.

C. U. Shepard: Report of Chester Emery Mine, p. 12.

1866. **Rutile, or Brookite.**

With diaspore. "Professor Shepard thinks he has sufficient evidence to pronounce it brookite."

J. L. Smith: Am. Jour. Sci., 2d series, Vol. XLII, p. 92.

1894. **Brookite.**

I have examined the best collections of Chester minerals, but have never seen brookite among them. The crystals studied by Shepard were destroyed in the burning of his collection at Amherst.

CALCITE.

1810. **Carbonate of lime.** Southampton lead mine.

B. Silliman: Bruce's Min. Mag., Vol. I, p. 64.

1818. **Carbonate of lime.** Southampton lead mine.

Yellowish crystals.

A. Eaton: Southampton adit; Am. Jour. Sci., 1st series, Vol. I, p. 137.

1818. **Laminated calcareous spar.** Deerfield, east of academy.

E. Hitchcock: Geol. Deerfield., ibid., Vol. I, p. 115.

1823. **Calcareous spar.** Chester.

Beautifully crystallized (Emmons).

J. Porter: Min. Loc., ibid., Vol. VI, p. 246.

1823. **Calcareous spar.** Southampton.

"A dodecahedron (hog-toothed spar). A short six-sided prism terminated by three-sided pyramid; same prism with all solid angles truncated."

Deerfield and Greenfield, in greenstone; Leyden and Conway, rhombs in coarse limestone.

E. Hitchcock: Geol. Conn., ibid., p. 211.

1823. **Satin spar.**

"In bituminous shale with ichthyolites at Sunderland."

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 236.

1823. **Argentine.** Southampton lead mine.

"Undulated, not parallel laminæ, of a pearly shining luster, often of a beautiful silvery white. Sometimes it is in thin plates which intersect and form small cells, containing crystals of calcareous spar. It occurs on very compact granite, and is also associated with fetid quartz. Is pure $CaOCO_2$."

Analysis.

CO_2	41.00
CaO	54.00
SiO_2	3.25
MgO, FeO	.75
	99.00

Professor Dewey: Ibid., p. 333.

1824. **Carbonate of lime.** Chester.

With chabasie and stilbite, 1 mile east of meetinghouse.

Six-sided tables, flat tables, six-sided prisms.

E. Emmons: Min. Loc., Am. Jour. Sci., 1st series, Vol. VII, p. 255.

1824. **Argentine.** Southampton.

The argentine from the Southampton mine occurs also grayish; it is beautifully phosphorescent on hot iron; the light a bright and strong yellow.

The mineral has been found in abundance at Williamsburg in considerable masses. Of a beautiful pearly luster and laminated.

Professor Dewey: Additional notices of argentine, ibid., p. 248.

1824. **Calcite.** Chester.

Crystals in mica-slate, six-sided, table truncated in all its angles, terminated by planes; lenticular from deep truncation of above six-sided prisms and six-sided pyramid. Hexahedral prism so truncated in alternate planes of extremities as to form pentagonal sides terminated by three pentagonal faces. Granular, highly crystalline. In layers in mica-schist. (Emmons.)

C. Dewey: Geol. Berkshire County; Am. Jour. Sci., 1st series, Vol. VIII, p. 32.

1824. **Fibrous limestone.** West Springfield.

Fibrous in fine red sandstone.

E. Emmons: Ibid., p. 34.

1824. **Argentine.**

That at Williamsburg decrepitates.

C. Dewey: Geol. Berkshire, ibid., p. 34.

1825. **Fibrous limestone** (satin spar). West Springfield.

Falls of Agawam River, forming perpendicular veins one-fourth to one-half inch thick in red sandstone slate. Calcareous spar in veins in greenstone, and sometimes embedded in amethyst.

Emerson Davis: Min. Not.; ibid., Vol. IX, p. 252.

1825. **Pisolite(?).** In large quantity on Chicopee River, Springfield.

Robinson's Cat., p. 71.

1825. **Argentine.** Williamsburg.

"We have recently discovered the locality of argentine. It occurs in large masses of a superior quality. I think some pure masses will weigh tons."

Letter of Mr. Morris Dwight: Am. Jour. Sci., 1st series, Vol. IX, p. 176.

1827. **Argentine.** Northampton.

Northwest corner of Northampton, passing into Williamsburg, near galena vein. With calcite and fluor pseudomorphs.

A. Nash: Lead mines of Hampshire County, ibid., Vol. XII, p. 257.

1835. **Argentine.** Westhampton (northeast part, not Williamsburg).

Attached to south end of mass of granite are fragments of mica-slate and micaceous limestone much contorted. Part of latter changed into argentine by the action of the granite.

E. Hitchcock: Geol. Mass., p. 307.

1835. **Fibrous limestone.**

In new red sandstone. Fibrous, up to 1 inch thick, in shale on Westfield River in West Springfield, and at Sunderland. Stalactites at Sunderland Cave, on east of Mount Toby, several inches thick.

Ibid., p. 231.

1835. **Carbonate of lime.** Southampton lead mine.

In distinct crystals; a dodecahedron composed of two six-sided pyramids; a short six-sided prism acuminated by three faces; also some with solid angles of prism truncated; delicate straw-yellow.

Ibid., p. 502.

1844. **Calcareous spar.** (*Calcialus rhombohedrus.*) (Argentine.) Williamsburg, Southampton.

J. D. Dana: Sys. Min., p. 246.

1882. **Calcite.** Deerfield.

Of the minerals which succeed to the prehnite, calcite and datolite are the most important and most abundant, and generally replace each other in different veins. In some a large development of calcite occurs with much axinite; in others an equally large development of datolite.

Excepting quartz, all the minerals enumerated above as inclosures in prehnite occur as inclosures in the calcite which follows it, and when pieces where the latter is abundantly developed are thrown in acid and the calcite nearly dissolved away, specimens of great beauty are obtained, the delicate frostwork of phenite, chalcopyrite, epidote, and the black stout axinites being set off against the brilliant luster of the etched calcite, the whole being sprinkled over with minute pale-green dodecahedra of fluor. It occurs abundantly in distinct crystals and drusy surfaces over the prehnite; $-\frac{2}{3}$ R small with rounded edges; 1^6 bristling over large surfaces; R^5, OR, 4 R ∞ R, R^3, with curved and striated faces; R^{12} with deeply striated faces and often distorted; R^7, $-\frac{1}{2}$ R^5 the first striated parallel to $-\frac{1}{2}$ R, and the former either acuminate or truncated by a single face of R. Other delicately suspended forms had at one end a single broad face of R and rose in a group of sharp scalenohedra at the other end. Everywhere the crystals were small and affected the most elongate forms with rounded edges and rounded, striated, and distorted faces, as if to imitate as closely as possible the prehnite with which they were associated, while on the datolite the forms 2 R or -2 R, R invariably appear in large perfectly transparent crystals up to 18 mm. in length, and with a luster equal to that of the datolite itself.

B. K. Emerson: The Deerfield dike and its minerals; Am. Jour. Sci., 3d series, Vol. XXIV, p. 352.

1882. **Calcite.** Northampton.

Half a mile below Smith's Ferry, in trap tuff.

Large cavities filled with a fine white crystallization in scalenohedra (R^3, R) 15 mm. long.

The same forms occur also in Delaney's quarry farther south, near the north line of Holyoke.

1886. **Argentine.** Northampton.

In granite on road from Leeds to Haydenville.

1886. **Argentine.** Northampton, at quarry south of W. N. Moore's, east of Florence.

Quartz pseudomorph after argentine.

1887. **Calcite.** Southampton lead mine.

On quartz; R^3 and R, R^3, with rounded faces; wine-colored crystals 12 mm. long. Also in large white opaque cleavage faces.

Hatfield lead mine R^3 twinned on O. Three-fourths inch long, opaque white, R with edges beveled by R^3 1 inch across. Is the oldest mineral in the vein at both mines.

1889. **Calcite.** Bardwells Ferry.

West side of river in cut of canal railroad. South side of river, 150 rods west of Bardwells Station.

R^3, twinned, parallel to 0, 1 inch long.

1889. **Calcite after salt.** West Springfield.

In black, shaly sandstone above dam on the Westfield River, west of the town.

Hopper-shaped cubes of salt, one-half to three-fourths of an inch across, which had been enveloped in the black shale, have been replaced by fine-grained white calcite, and show on surface in white crosses, squares, and triangles. Have been called chiastolite, octahedrite, and spinel.

Specimen kindly given by Mr. J. S. Diller. The full history of this interesting pseudomorph is given under Salt.

1890. **Calcite.** Loudville, Southampton, lead mine.

Now altered into limonite; ∞ P, — ½ R; 5 mm. long. On quartz.

1890 **Satin spar.** Chicopee.

Fine, fibrous calcite, in broad veins, in new red sandstone, below dam near mouth of Chicopee River.

Analysis by C. L. Upton, class of 1891, Amherst College:

CO_2	42.26
CaO	53.59
Fe_2O_3	1.30
MgO	1.25
Insoluble	1.15
	99.55
Sp. gr	2.73

1890. **Concretions.**

Irregular concretions, septaria, occur in abundance in the upper shales of the Trias about Springfield and Chicopee.

Very regular and varied forms occur abundantly in the Champlain clays, especially in the banks of the river in Hadley and Montague.

1891. **Calcite.** Chester. Emery mine.

Form R; also same twinned parallel to — ½ R on magnetite.

1891. Tufaceous incrustation from tube of artesian well at South Hadley.

Analysis by C. L. Upton:

CO_2	38.21
CaO	46.79
MgO	5.46
Fe_2O_3	.80
Insoluble	5.51
	96.77

CASSITERITE.

1825. **Pyramidal tin ore.** Chesterfield.

Mohs. Min., Vol. II, p. 387. Haldinger's ed., Edinburgh.

1829. **Oxide of tin.** Goshen.

At the tourmaline locality a single hemitropic octahedron weighing about 50 grains.

E. Hitchcock: Tin in Massachusetts; Am. Jour. Sci., 1st series Vol. XVI, p. 188.

1832. **Tin.** Goshen.

"I am able to say with perfect confidence that this interesting mineral exists in Massachusetts, but can add little more. I found only a single crystal of its oxide, weighing 50 grains. But this I myself dug from a block of granite in the northeast [northwest] part of Goshen, and on reducing it to metallic tin it corresponds in every respect with that metal from England. I have never been able to find any more specimens."

E. Hitchcock: Geol. Mass.; Am. Jour. Sci., 1st series, Vol. XXII, p. 62.

1835. **Oxide of tin.** Goshen.

"The single crystal was an octahedron with square base, though the measurement of several angles did not agree with those given in the books."

E. Hitchcock: Geol. Mass., p. 509.

1841. **Oxide of tin.** Goshen, northwest part.

"In the sixteenth volume of the American Journal of Science I have given a particular account of the single crystal of oxide of tin which I found several years ago at the well-known locality of several interesting minerals in the northwestern part of Goshen; octahedron with square base. It occurs also in the granite of Chesterfield."

E. Hitchcock: Geol. Mass., p. 706.

1843. **Oxide of tin.** Chesterfield.

Stated to exist in Chesterfield (in Haldinger's edition of Mohs) in "small groups of black twin crystals," and in Dana's description. An analysis (by Hayes) here first given: Crystals P, ∞ P ∞—no twins.

J. E. Teschemacher: Description of the oxyde of tin at the tourmaline locality, Chesterfield; Trans. Assoc. Am. Geol., Vol. I, p. 296.

1862. **Cassiterite.**

Now frequently found in the granite of the adjoining towns of Goshen and Norwich (Huntington).

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XXXVII, p. 407.

1882. **Cassiterite.**

I have seen very fine crystals from Chesterfield (25 mm. long, wedged in interstices of tourmaline) in W. E. Webster's collection at Northfield, and fine specimens are preserved in the Shepard collection in Amherst College.

CELESTITE.

1835. **Sulphate of strontia.** West Springfield.

Radiated, on fetid Triassic limestone in West Springfield. Sp. gr. 4. In blowpipe test melts and tinges flame red.

E. Hitchcock: Geol. Mass., p. 232.

1858. **Celestine.** Holyoke. Meacham's quarry.

In Triassic sandstone.

E. Hitchcock: Catalogue of State Museum in Rep. of State Board of Agriculture, App., part xx, No. 107.

CERUSSITE.

1823. **Carbonate of lead.** In cavities of the matrix of the lead mine at Southampton.

White, mixed with yellow; decrepitates and yields lead. It occurs crystallized as follows: Two six-sided pyramids, united at their bases and deeply truncated at their apices, 14 faces; six-sided prism, terminated by four-sided pyramids, 2 of the faces enlarged, 14 faces; tabular prisms with bevelment on the edges. These tables frequently cross each other.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 234.

1825. **Carbonate of lead.** Loudville mine, Southampton.

Crystallized in right rhombic prisms; green carbonaceous from infiltrated malachite. Earthy, carbonaceous, reddish-brown, massive, and disseminated.

C. U. Shepard: Min. Loc.; ibid., Vol. IX, p. 249.

1835. **Carbonate of lead.** Southampton.

E. Hitchcock: Geol. Mass., p. 507.

1841. **Carbónate of lead.** Southampton.

E. Hitchcock: Geol. Mass., Final Rep., p. 705.

1885. **Cerussite.** Manhan lead mine, Loudville.

A cavity in quartz 5 cm. across, formerly filled by calcite—the quartz having penetrated the cleavage of the calcite on enveloping it—is lined by fine crystals 5 mm. long, which strikingly resemble quartz crystals in the development of their faces; they have adamantine luster, translucent, and are pale topaz color; on them rest two larger crystals of a later generation, 23mm. long, exteriorly colored like the others, interiorly flesh colored, verging on pink. Also beautiful six-rayed penetration twins occur, as in fig. 599 of Dana's Treatise on Mineralogy.

The smaller crystals mentioned above have the form P, ∞ P, 0 P, penetration twins of two individuals; the larger ∞ P $\breve{\infty}$, $\frac{1}{3}$ P $\breve{\infty}$, P, ∞ P $\breve{3}$; the domes horizontally striated and curving into each other.

The specimen is in the Clark collection of Smith College.

1892. **Cerussite.** Leverett, Hatfield.

Occurs rarely in the baryta veins on quartz and galena, forms P (111), 2 P $\breve{\infty}$ (021), and stellate twins.

CHABASITE.

1818. **Chabasie.** Deerfield.

Considerably abundant crystals up to one-fourth inch occur in veins of greenstone, both in geodes, on balls of zeolite, on chalcedony, and on lamellar quartz.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 114.

1823. **Chabasie.** In cuboidal crystals at Chester (Emmons).

J. Porter: Loc. Min., ibid., Vol. VI, p. 248.

1823. **Chabasie.** Deerfield.

"Hundreds of specimens have been obtained at this place. To procure them, however, requires much labor."

E. Hitchcock: Geol. Conn. River, ibid., Vol. VI, p. 224.

1824. **Chabasie.** Chester.

Cuboidal crystals one-fourth inch across. Straw-yellow and white; fissures and veins in mica slate 1 mile east of meetinghouse in Chester.

E. Emmons: Min. Loc., ibid., Vol. VII, p. 254.

1844. **Chabazite.** (*Chabazius rhombohedrus.*) Chester.

J. D. Dana: Sys. Min., p. 340.

1882. **Chabazite.** Middlefield.

On arenaceous, black mica-schist; coating surface with wine-yellow rhombohedrons one-eighth inch across.

1882. **Chabasite.** (**Haydenite.**) Chester.

Crystals all simple, beautifully striated and aggregated, intergrown with stilbite on dark-gray mica-schist, three-sixteenths of an inch across. The finest specimens were destroyed in the burning of the Shepard collection.

1882. Chabazite. Cheapside, Deerfield.

At Cheapside it occurs in small, pellucid rhombohedra with delicately striated faces. Crystals 1 mm. in length. It rests always upon the trap, and never upon the heulandite with which it is associated, though when they come in contact the latter penetrates the chabazite and is the older mineral.

Farther southeast of Old Deerfield it occurs in the same association. Most of the specimens agree in all respects with those already described, but are whitened and opaque from incipient decomposition. Rarely much larger crystals occur, which are 6 to 8 mm. in length. These are quite fresh, the faces of good luster, but faceted in a very intricate manner, indicating that the twinning by which the apparent rhombohedra are built up has reached here an unusual complexity. The crystals are commonly twinned on 0, and in three cases very perfect twins, composition face R, occur, both halves being developed to perfect rhombohedra. In a single instance the apex of a crystal is replaced by three large, deeply striated faces of a flatter rhombohedron, apparently $\frac{1}{2}$ R. The striæ run parallel to the combination edge of R and $\frac{1}{2}$ R, and are plainly formed by the oscillatory combination of $\frac{1}{2}$ R and 0. The character of the face did not allow accurate measurement. In thin fissures it incrusts broad areas, producing a tessellated surface made up of a great number of flattened crystals showing each a single face of R, the adjacent ones being in twin position and the whole reflecting the light together like a single face of a very large crystal.

B. K. Emerson: The Deerfield dyke and its minerals; Am. Jour. Sci., 3d series, Vol. XXIV, p. 359.

1887. Chabazite. Monson. Flint's quarry, north end.

On horizontal joint surfaces on hornblendic gneiss bands in the biotite gneiss; broad surfaces of minute, aggregated, colorless rhombohedra, 1 mm. across, followed by stilbite.

1890. Chabazite. Greenfield.

Occurs in small colorless rhombohedra at the quarry opened in the west bluff of the trap for road material. It is just below the lookout on the crest of the range.

1891. Chabazite. West Northfield. Wood road west of E. L. Holton's.

On fissures of Bernardston (Devonian) mica-schist. Broad, thin squares one-half inch across, formed by the development of rhombohedra in a narrow space; striated; buff color from decomposition.

1891. Chabazite. Buckland.

In large, colorless rhombohedra in fissures in biotite gneiss, at the quarry on the railroad near Shelburne Falls.

1892. Chabazite. Chester. In amygdaloid.

E. S. Dana: Sys. Min., p. 592. Should be "in mica-schist."

CHALCOCITE.

1887. Chalcocite. Southampton lead mine.

In large masses; rare; surrounding chalcopyrite in layers 8 to 10 mm. thick, and itself surrounded by chrysocolla.

1888. Harrisite. Manhan lead mine, Loudville.

In thick black coating, having when thin a blue tarnish, on galena.

Both the above in the Clark collection in Smith College.

CHALCOPYRITE.

1810. **Copper pyrites.** Loudville.

B. Silliman: Bruce's Jour., Vol. I, p. 68.

1818. **Copper pyrites.** Greenfield. Banks of Connecticut River.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 115.

1823. **Pyritous copper.** Southampton, Leverett, Deerfield, Greenfield.

"At Leverett lead mine, amorphous. At Deerfield and Greenfield, in veins in greenstone and sandstone.

"At Southampton lead mine, where it occurs amorphous and crystallized in regular tetrahedrons, which are insulated on calcareous spar. For the specimens containing these crystals I am indebted to Dr. David Hunt."

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 231.

1826. **Pyritous copper.** Westfield.

"In bituminous marlite."

E. Davis: Rocks and minerals of Westfield, ibid., Vol. X, p. 215.

1832. **Pyritous copper.** Montague. On southern island at Turners Falls.

Rich, and in considerable quantity.

E. Hitchcock: Geol. Mass., p. 62; also Am. Jour. Sci., 1st series, Vol. XXII, p. 61.

1832. **Pyritous copper.** Leverett, Southampton.

E. Hitchcock: Geol. Mass., p. 507.

1838. **Sulphuret of copper.** Russell, farm of J. Gould.

In vein with blende and galena.

E. Hitchcock: Econ. Geol. Mass., p. 127.

1841. **Pyritous copper.** Greenfield.

"One vein on bank of Connecticut River, 100 rods below mouth of Fall River, the other a mile lower down; both several feet wide; in trap and sandstone; gangue, sulph-baryta and toadstone; green carbonaceous and pyritous copper.

On the south island at Turners Falls a vein of pyritous copper of rich quality and in considerable quantity. Indeed, several varieties of the sandstone rocks there seem to be impregnated with copper."

E. Hitchcock: Geol. Mass., p. 203.

1865. **Chalcopyrite.** Chester emery mine.

Few grains in margarite; upon joints of gneiss near the vein, with malachite.

C. U. Shepard: Report Chester emery mine, p. 12.

1882. **Chalcopyrite.** Greenfield, Cheapside, Gill.

Occurs disseminated in particles in the trap, in the prehnite, and in the calcite above (the latter rarely in tetrahedra up to 2 mm. in length), in cavities in the prehnite, and in minute, fresh-looking striated tetrahedra in calcite. Also on botryoidal diabantite and in the "chlorophæite" in Gill.

B. K. Emerson: Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 350.

1883. **Chalcopyrite.** Turners Falls. Island in river.

There was a very fine rich specimen in the Shepard collection, destroyed by fire in 1883.

1888. **Chalcopyrite.** Davis, Rowe.

Shipped as an ore from the Davis mine, disseminated in pyrite. Min. Resources of U. S. for 1887, p. 742.

CHIASTOLITE.

See Andalusite.

CHLORITE.

See Prochlorite.

CHLORITOID.

5. **Masonite** (the variety near to ottrelite). Chester.

Is abundant at many places in the emery vein on the North Mountain.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XL, p. 123.

5. **Ottrelite** (masonite, chloritoid). Chester emery mine.

Belongs to the same group as margarite. In disseminated scales of a dark, blackish-green color, whose breadth is rarely more than one-fourth of an inch. They present considerable resemblance to mica, but when seen on weathered surfaces of the veins or on open joints of the rock are easily distinguished by their greater hardness and want of elasticity. It is chiefly confined to the stony emery, i. e., the chloritoidal rock or substance of the vein. Over 20 per cent FeO, 6 per cent H_2O. It stands in relation to mica somewhat as emery does to corundum.

C. U. Shepard: Report Chester emery mine, p. 10.

5. **Chloritoidite.** Chester.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 4.

The biotite in transverse plates in the spangled mica-schist has often been called ottrelite (phyllite, Thomson, in Dana's Mineralogy). See citations under Biotite.

CHLOROPHÆITE.

. **Chlorophæite.** (J. W. Webster.)

Additions to the cabinet of minerals at Cambridge presented by Rev. Mr. Hitchcock; greenstone containing rounded nodules of a dark-green color, which on examination I find to be chlorophæite.

J. W. W.: Bost. Jour. Phil., Vol. III, p. 610.

. **Chlorophæite.** Turner's Falls, Gill.

"Trap rocks about Turner's Falls, in Gill. (Determined by J. W. Webster.) Is in radiating masses, pea to bullet size, several frequently united. Sometimes cavities partly filled with calcite. Newly broken yellowish-green or dark bottle-green, sometimes semitransparent; darkens on exposure; this is obvious in one-half hour in sunlight; in a few hours is nearly black, and then radiated structure becomes less and less distinct and in some black specimens is scarcely to be discerned; at surface all nodules are changed to black, dark-green, or the dull muddy-green of steatite, and the same an inch or more into the rock. Some specimens are of dark-cinnamon color, others long exposed become covered with a rusty powder; it is so soft as easily to be scratched by the finger nail. Occurs 80 rods below the falls on the north side, and 20 to 30 rods above the mouth of Fall River. To be distinguished from chlorite (delessite), which is in folia. The chlorophæite is in minute acicular needles."

E. Hitchcock: Am. Jour. Sci., 1st series, Vol. X, p. 393.

. **Chlorophæite.**

"It appears to be decomposed mesotype."

C. U. Shepard: Min., 1st ed., Vol. II, p. 125.

1841. **Chlorophæite.** Gill.

"This mineral when the rock is first broken is of a dull-green color, but after a few hours' exposure it becomes nearly black; after long exposure, however, some specimens assume a dark-brown color. For the most part, the nodules—often half an inch and sometimes more than an inch in diameter—exhibit a fibrous structure, the fibers radiating from one or more centers in the same nodule. The mineral is easily scratched with a knife, and the powder is of a dull-green color. When fractured, however, it appears brittle, and sometimes calcareous spar is inclosed in the chlorophæite, but very rarely are the nodules hollow. If I mistake not, in one or two instances I have observed a foliated structure in the specimens; associated with prehnite, chlorite, and pyritous copper; the rock only slightly amygdaloidal."

E. Hitchcock: Geol. Mass., p. 660.

1852. **Chlorophæite.**

Stands in close connection with chlorite or green earth.

C. U. Shepard: Min., 3d ed., p. 151.

1878. **Chlorophæite.** "Gill, in Massachusetts, and Turners Falls, in Connecticut."

P. Groth: Min. Col., Strasburg, p. 258.

(Turner's Falls is in Gill.)

1882. Products of the decomposition of prehnite (chlorophæite of Hitchcock).

The mineral chlorophæite, described by Macculloch in 1825, but not analyzed, proves now, from the analysis of Heddle,[1] to be of very different composition from the highly hydrated protoxide of iron silicate analyzed by Forchhammer, with which it has been associated. It is a magnesian peroxide of iron silicate, with about 25 per cent of water, sometimes aluminous, and it approaches thus more nearly to diabantite, from which it differs mainly in the peroxidation of the iron and in containing double the quantity of water.

In 1825 President Hitchcock discovered a mineral "in the trap rocks about Turners Falls, in Gill, Mass.,[2] which Prof. J. W. Webster, of Harvard University, pronounced to be the chlorophæite of Macculloch." The description given by President Hitchcock agrees so exactly with that of Macculloch and Heddle, and the rapid blackening of the mineral is so peculiar, that the reference was very natural, and I think correct.

On examining slides of the "smoked" prehnite[3] last described, its radiated needles were in the center colorless and perfectly fresh, and contain in abundance scales of diabantite, with remarkably strong dichroism brown-green to black. Although the smoky, black mass resembled closely an amygdule of the chlorophæite, its great hardness and the crystalline surface proved it to be prehnite, and the peculiar striation dependent upon the arrowhead twinning was quite as characteristic. Toward the outer surface, however, the mass softened rapidly and could be readily impressed by the finger nail, and under the microscope the fibers were seen to change quite rapidly into an amorphous or fine, scaly material of red-brown color, showing faint aggregate polarization, but no dichroism. Farther in among the clear needles portions of the mass have all the needles likewise stained brown superficially. On examining President Hitchcock's original speci-

[1] Trans. Royal Soc. Edinburgh, Vol. XXIX, p. 84.

[2] Am. Jour. Sci., 1st series, Vol. X, p. 393.

[3] See Prehnite.

82. Products of the decomposition of prehnite—Continued.

men, No. 91 of the last catalogue of the Massachusetts State collection,[1] it was found to be distinctly radiated from several centers, the fibres of the same size and arrangement as those of the fine fibrous prehnite, and a fragment broken from the specimen gave a pale-green powder and scratched apatite without difficulty. The cavity in which it is found is lined first with the foliated diabantite, then follows inwardly chalcopyrite, chlorophæite, the latter occupying thus the same place as the prehnite in the unaltered nodules.

Under the microscope traces of the bright quartz-like polarization and the peculiar striation of prehnite could be clearly seen. The latter mineral was, however, for the most part changed into a red-brown, indistinctly scaly mass, with very faint polarization. The fibers of the original prehnite had not been at all fused together or changed in their relation to each other, and nothing was interposed among them. Other nodules completely changed showed also the network of black material between the needles. In specimen No. 92 of the same collection with H. 1.5, the fibrous structure is much less distinct than in the former one; both are of the same dull, black color, but under the microscope it is seen to be made up of the same faintly scaly red-brown material arranged in radiated needles exactly as before, but now showing no trace of the further presence of unchanged prehnite. The brown material is not to be distinguished under the microscope from that which results from the change of diabantite, except that in each case the structure of the original mineral is retained.

In other cases the change of the prehnite has taken another course. In the variety from the new cutting at Cheapside, where the lustrous bars of the mineral are interwoven with minute green fluor, the bars change toward the side where the fissure in which they were formed opened into the main vein, gradually into a pale-green scaly mass which retains for a distance the shape of the bars and their relation to the fluor, but farther on is blended into a pale-green mass with satiny luster, which looks as if it had been worked up into a paste and dried in a thin layer upon the surface. Similar masses are found abundantly, especially in the datolite, and under the microscope still contain fragments of fresh unchanged prehnite.

The mineral itself is under the microscope seen to be made up of loosely aggregated scales and to show a bright green color and a dichroism, both like that of diabantite. It is apparently hexagonal, many scales remaining black during a complete revolution between nicols. Its lighter color seems to be the result of its different aggregation, and the powder of both is of the same light green. Prehnite can thus change into a mineral very similar to, if not identical with, diabantite (enough pure material for an analysis could not be obtained), and both the prehnite and the common scaly radiated diabantite change into red-brown almost amorphous materials which can not be distinguished microscopically.

I have assumed, on what seems good grounds, that the diabantite which fills the fibrous prehnite so often was formed at the same time with the latter, and it often shows a zonal arrangement in the prehnite which goes far to show that this was so, and in the specimens the two cases[2] can be easily distinguished. On the other hand, I think the change of the prehnite is primarily into the green diabantite-like mineral and through

[1] State Board of Agricult. Report, Vol. VI, Appendix, p. 16, where the mineral is printed "Chlophocite."

[2] That of the diabantite originally inclosed in the fresh prehnite and the similar scaly mineral formed from the decomposition of the latter.

1882. Products of the decomposition of prehnite—Continued.

this into the brown peroxidized substance, and that the instability of the first or protoxide stadium of the substance is the condition of its rapid change from green to brown or black when exposed to the air. Indeed, this is also a striking characteristic of the common diabantite itself, and fresh trap specimens lose their green tint and soon turn brownish-black if exposed to the weather, though the change does not occur with such remarkable rapidity as in the case with the prehnite-diabantite, or chlorophæite. Professor Heddle explains the sudden change of color by shrinkage-cracking, due to partial dehydration.

B. K. Emerson: The Deerfield dike and its minerals; Am. Jour. Sci., 3d series, Vol. XXIV, p. 276.

CHONDRODITE.

1884. **Chondrodite.** Middlefield.

Occurs in the pre-Cambrian limestone at the mouth of Coles Brook, at the railroad cutting, west edge of large bed, in reddish and grayish grains changing into serpentine. It can also be found at various places in the band of limestone which extends from this point north to the school at Factory Hollow.

CHROMITE.

1820. **Chromate of iron.** Cummington.

E. Hitchcock: Am. Jour. Sci., 1st series, Vol. II, p. 374.

1823. **Chromate of iron.** At Cummington soapstone quarry.

Only a small mass has as yet been discovered.

J. Porter: Min. Not., ibid., Vol. VI, p. 248. There is no soapstone quarry in Cummington. The quarry in Windsor, cited below, which is near the Cummington line, must have been meant.

1823. **Chromate of iron.** Cummington, Middlefield in serpentine (Eaton).

Cummington, well characterized and almost resembling the Baltimore chromate; in a loose mass found by Dr. J. Porter.

E. Hitchcock: Geol. Conn. River, ibid., p. 233.

1833. **Chromate of iron.** Cummington. Blandford.

"While the second edition of this work was passing through the press I have discovered the chromate of iron in serpentine in Blandford; specimens 4 to 5 pounds weight."

E. Hitchcock: Geol. Mass., p. 52, 366; also Am. Jour. Sci., 1st series, Vol. XXIV, p. 397.

1835. **Chromate of iron.** In the east part of Windsor, near soapstone quarry, in serpentine.

E. Hitchcock: Geol. Mass., p. 363. Cummington, Blandford, ibid., pp. 52, 369.

1838. **Chromate of iron.** Chester.

Report of Dr. H. Holland. Appears in the eastern portion of the serpentine; three outcrops 5 to 18 inches wide; 1,200 pounds of ore obtained; one mass pure, 60 pounds; trace of platinum. CrO 52–53, FeO 33–35. Salts prepared from it are in the State collection.

E. Hitchcock: Econ. Geol. Mass., p. 124.

1841. Chromate of iron. In serpentine, 5 miles northwest of Blandford, on Becket road.

Tuberculous masses rarely as much as a foot in diameter; in masses a few inches in diameter; contains 30 per cent of oxide of chrome (Dr. H. Holland). A few miles north in the west part of Chester, near the railroad, on branch of Westfield River, a much larger vein was discovered by Dr. Holland. It is situated in the eastern portion of the serpentine, perhaps 300 feet above the railroad, where it cuts through the serpentine, and on the same side of the river. Said by practical chemists to afford 43 per cent CrO (Holland).

Analysis (by Dr. Hitchcock).

CrO	34.63
Fe_2O_3	50.65
SiO_2	9.27
Al_2O_3	5.45
	100.00

E. Hitchcock: Geol. Mass., 1841, pp.191, 618.

1882. Chromite. Pelham.

From the serpentine near the asbestos mine. In grains 3 to 5 mm. in diameter.

CHRYSOCOLLA.

1876. Chrysocollite. (C. U. Shepard.) Southampton lead mine.

C. U. Shepard: Cat. of Min., within 75 miles of Amherst College, p. 3.

1888. Chrysocolla. Manhan lead mine, Southampton.

In layers 5 to 10 mm. thick, coating cuprite and chalcopyrite; rare; finest specimens in Clark collection in Smith College.

CHRYSOLITE.

1876. Pelhamine. (C. U. Shepard.) Pelham.

"Singular seams and masses, sometimes a foot thick at the asbestos mine, associated with bronzite and talcite; tough and so not serpentine; lusterless; powder dark greenish-gray; H. = 5; Gr. = 2.9—3.2. B. B. infusible, but turns cinnamon-red; not decomposed by acids.

Analysis.

SiO_2	38.40
FeO	15.52
Al_2O_3	2.80
H_2O	3.40
MgO (dif.)	39.88
	100.00

C. U. Shepard: Contrib. to Min., p. 3. (Priv. pub.)

1876. Pelhamine. Pelham.

Is allied to chrysolite.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 5.

1881. **Olivine.** Pelham.

The black, tough masses at the Pelham asbestos quarry called pelhamine by Shepard prove upon microscopical examination to be a colorless chrysolite in intimate mixture with chromite and other oxides. It makes the mass of an immense intrusive neck in the Becket gneiss as the principal ingredient of an olivine rock which contains much magnetite and little bronzite and is separated from the gneiss by a broad band of biotite, anorthite, corundum, and apatite of so much special geological interest that it is described at length in the forthcoming monograph upon the geology of the region.

1883. **Olivine.** Shutesbury, New Salem.

The so-called serpentine masses in the centers of these two towns are largely olivine, in the same position in the gneiss and with the same associated minerals, in part, as in the Pelham locality. In all these localities the mineral is of so much more lithological than strictly mineralogical interest that I have discussed it under the former head, as indicated above.

1883. **Olivine.**

A pale olive-green olivine in crystalline grains .5 mm. to 2 mm., superficially reddened by decomposition, in a light-gray amygdaloid bowlder in the till on the north slope of Mount Holyoke, just west of the Notch.

1884. **Pelhamine.** Pelham.

The serpentinous substance called pelhamine by Prof. C. U. Shepard admits of a good polish and with a very curious effect.

Kunz: Precious stones; Min. Res. of the U. S., 1883–84, p. 776. Gems and precious stones, 1890, p. 189.

1885. **Olivine.** South Hadley.

I have never with certainty detected olivine in the large Holyoke and Deerfield diabase beds, but in the later volcanic necks, especially in that north of Moodys Corners, small brick-red decomposed olivines are quite frequent.

CLINOCHLORE.

1879. **Clinochlore.** North Blandford.

In coarse, large, foliated masses at Bartholomew's soapstone quarry, Blandford.

Similar occurrence at Osborne's soapstone quarry. Optically positive. Quite strongly biaxial. Dichroic green and red; weakly so with microscope. Very dark green, in broad plates much cut by gliding planes.

1889. **Clinochlore.** Chester.

Pseudomorph. Mixture of epidote and clinochlore after hornblende.

In the collection of E. B. Underhill, formerly of Hallocks Mills, Westchester County, N. Y., which was bequeathed to Amherst College, was a specimen labeled "Chloritoid pseudomorph after hornblende, Chester, Mass." This collection was labeled, as he informed me, by Mr. J. S. C. Bailey, who, I believe, largely formed the collection; and as Mr. Bailey has collected extensively in Chester, I presume he obtained the specimen there. It came manifestly from the cutting near the railroad station from the white granular quartzite, containing shining, black hornblende blades, and I have since found it at that place. These are here changed centrally into pale pistachio-green granular epidote and dark-green chlorite having the optical properties of clinochlore. The blades are above an inch long and one-third of an inch wide.

1892. Clinochlore. Orange.

Soapstone quarry at southwest corner of Big Tully Mountain. In broad plates of clear green in granular dolomite and impure talc. Optically positive and nearly uniaxial.

COBALTITE.

1820. Arsenate of cobalt. Sturbridge, Monson.

Disseminated in small quantities in a large mass of hornblende connected with the graphite of the Sturbridge mine.

In hornblende rock in Monson; in hornblende rock on west side of Connecticut River Dr. Hunt found arsenide of cobalt.

A. Eaton: Index, pp. 118, 139.

1825. Arsenate of cobalt. Monson.

In primitive trap in small quantity.

A. Eaton: Index; Robinson's Cat., p. 61.

(No further notice of this mineral. Much whitish pyrite occurs at the Sturbridge mine and in hornblende-schist at the Monson quarry.)

COLOPHONITE.

See Garnet, 1823.

COLUMBITE.

1829. Stanniferous columbite. Chesterfield, Goshen.

In a loose stone in the foundation of a stone fence (at a little distance from the south end of the tourmaline ledge), in feldspar, beryl, and mica, 15 to 400 grains in size—1,400 grains in all; sp. gr. 6.00; crystal figured; contains columbic acid, tin, iron, manganese, lime trace.

Also at Goshen, at Weeks's farm, and 4 miles east of first location of spodumene. Small imperfect tabular crystals in spodumene.

C. U. Shepard: Discovery of columbite in Chesterfield, Mass.; Am. Jour. Sci., 1st series, Vol. XVI, p. 220.

1835. Columbite. Chesterfield, Goshen.

Chesterfield tourmaline locality. Right rectangular prism, several modifications; two places in Goshen in spodumene. (Shepard.)

E. Hitchcock: Geol. Mass., p. 509.

1835. Columbite. Chesterfield.

The columbite of Chesterfield consists of the oxides of columbium, tin, iron, manganese, with trace of lime. More distinct crystals (than from Haddam), and of greater size, come from Chesterfield.

C. U. Shepard: Min., 1st ed., Vol. II, p. 140.

1841. Columbite. Chesterfield, Goshen.

At tourmaline locality in Chesterfield, and also at two places in Goshen, embedded in spodumene.

E. Hitchcock: Geol. Mass., p. 704.

1844. Columbite. Chesterfield.

Small crystals; brilliant, transparent, dark ruby-red.

J. S. Teschemacher: Bost. Jour. Nat. Hist., Vol. IV, p. 502.

1866. Columbite. Northfield.

"Sent me last autumn by Mr. M. A. Brown, of Springfield, Mass.; found on land of Mr. Simeon Lyman, 1 mile northeast of village. In much disintegrated graphic granite in mica-slate; tolerably well crystallized, black and shining; sp. gr. 6.5. Nearly identical with the Bodenmais variety. Supply limited."

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 248.

1876. **Columbite.** Northfield, Chesterfield, Goshen.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 7.

1882. **Columbite.** Northfield.

In granite vein in lane one-half mile east of John Moody's house. Mr. M. A. Brown got $400 worth. Also with beryls. Best crystals went to Prof. George A. Brush.

Good crystals in W. E. Webster's collection, Northfield. Locality exhausted.

1883. **Columbite.** West Chesterfield Hollow.

Crystals 1 inch long; striated curiously, as if molded when soft.

In W. E. Webster's collection, Northfield.

1886. **Columbite.** Northfield.

Is almost a tantalate, with 57 per cent Ta_2O_5 and 27 per cent Nb_2O_5, and sp. gr. 6.84. Agrees with the general habit of columbite, as it has the same faces, and—in so far as one can judge from the imperfect measurements—the same angles. The crystals, which are large and rough, show the common rectangular habit with the faces *a* (100), $\infty \breve{P} \infty$; *b* (010), $\infty \check{P} \infty$; *c* (001), 0 *P*; *m* (110), ∞P; z (530), $\infty \bar{P} \frac{5}{3}$; k (103), $\frac{1}{3} \bar{P} \infty$; *n* (163), $2 \check{P} 6$; *c*: k = 20°; *b*: z = 63°.

E. S. Dana: Ueber den Columbit; Zeit. Krys., Vol. XII, p. 266. Abstract Am. Jour. Sci., 3d series, Vol. XXXII, p. 386.

COOKEITE.

1879. **Cookeite.** Chesterfield, in cleavelandite.

A. A. Julien: Ann. N. Y. Acad. Sci. Arts, Vol. I, p. 351.

1882. **Cookeite.** Chesterfield.

Fine specimen in W. E. Webster's collection, Northfield, Mass.

COPPER.

1823. **Native copper.** Whately.

In geest on the limit between the primitive and alluvial soil, and about 5 miles from the secondary greenstone of the coal formation. The piece weighs 17 ounces, exhibits imperfect rudiments of octahedral crystals on the surface, and is incrusted by green carbonate of copper. The cavities also contain a very little red oxide of copper.

E. Hitchcock: Am. Jour. Sci., 1st series, Vol. VI, p. 230.

1843. **Copper.** Whately.

"The first piece of copper was found along the line of junction between the sandstone and the primary rocks in a plowed field; the second piece 2 miles farther to the west among the hills. I incline to the opinion that neither of these specimens originated in the trap or the sandstone, but in the primary rocks to the north of the places where they were found. They were mostly coated by the green carbonate and the red oxide (?). The last specimen was partially covered also with crystals of quartz deeply implanted. The extremities of these have all been broken off in efforts to cut the specimens into pieces, but their lower extremity may still be seen in the only fragment of this fine specimen which can now be found and which I lay upon the table with the former specimen uninjured."

E. Hitchcock: Ann. N. Y. Acad. Sci., 1843; also Am. Jour. Sci., 1st series, Vol. XLVII, p. 323.

1843. Copper—Continued.

The word geest above was used to designate the drift and the diluvial gravels.

Similar bowlders of copper have been found in Connecticut within the limits of the red sandstone, and a fine specimen is preserved in the Yale College cabinet. Those mentioned above doubtless came from the neighborhood of the trap, apparently reduced by it from older copper veins. It is hard to see how the pieces can have been carried south 10° west from the trap in Greenfield to Whately by the ice. Perhaps they had been lost there by the Indians.

The first specimen mentioned above is in the mineral collection of Amherst College. There are several cavities upon the surface from which quite large crystals apparently of calcite have been removed.

A specimen of native copper is in the museum of Amherst College having this label in President Hitchcock's handwriting: "Native copper found in drift 200 rods west of the meetinghouse in Whately, and on the farm of Rufus Dickinson, and presented by him and Dennis Dickinson to the college cabinet. Weight, 2½ pounds."

CORDIERITE.

1835. Iolite. Goshen.

"Stated to have been found in Goshen. I have not met with it."

E. Hitchcock: Geol. Mass., p. 507.

Refers to the "goshenite" of Goshen. (See under Beryl.)

1838. Iolite. Brimfield.

One-half mile northeast of village on road to Warren, near house of Samuel Patrick. In granite; violet-blue; no crystals; found 1835; with molybdenite, black mica, and garnet.

J. W. Foster: Am. Jour. Sci., 1st series, Vol. XXXIII, p. 399.

(The molybdenite is graphite.)

1844. Iolite. (*Hyalus bicolor.*) Brimfield.

J. D. Dana: Sys. Min., p. 406.

1886. Cordierite. Brimfield, Sturbridge.

On the west side of the road to Warren, and near the town line, 1 mile north of Elisha Marsh's house. In coarse granite associated with moonstone-like orthoclase, precious garnet, and fibrolite; deep blue to colorless; in granular masses up to the size of a robin's egg. Also found on the top of Shumway Hill, in Sturbridge, by G. H. Haynes, of the class of '87 in Amherst College, in larger darker masses in same rock.

1890. Iolite. Brimfield.

In gneiss with andalusite.

Kunz: Gems and precious stones of the United States, p. 159.

(Incorrect; should be "in granite with fibrolite").

1892. Cordierite. Ware.

In the first cutting south of the station on the Central Railroad. In deep-blue granular masses. The fibrolite schist is here full of veins and twisted lenses of pegmatite, and the cordierite is contained in these near their borders, and at times rounded blebs of the deep-blue mineral are inclosed in the chatoyant carlsbad twins of orthoclase.

CORUNDOPHYLLITE.

1865. Chloritoid. Chester.

C. T. Jackson: Am. Jour. Sci., Vol. XXXIX, p. 87.

1865. Corundophyllite. Chester emery mine.

Mineral not fully analyzed. Imperfect examination made upon a few grains of it found along with the sapphire of Buncombe, N. C., lead to the conclusion that it, like the ottrelite, is a silicate of alumina and iron with but little lime and magnesium. Des Cloizeaux has described it as one of the micaceous minerals, but it rather appears to belong to the clinochlore group. Its crystallization is near to mica; H.=2–3. Inelastic, almost brittle; in color and in the arrangement of its particles, even when giving rise to a slate, as it often does, it does not resemble the well-known mineral chlorite. It is of all others the most abundant gangue mineral of the purer varieties of both emery and magnetite.

C. U. Shepard: Report Chester emery mine, p. 10.

1865. Corundophyllite. Chester.

Abundant; called chloritoid by Dr. Jackson.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XL, p. 112.

1866. Corundophyllite. Chester.

Analysis (given below in 1868) from material supplied by Prof. C. U. Shepard, with description; referred to ferriferous clinochlore (ripidolite).

F. Pisani: Ibid., Vol. XLI, p. 394.

1866. Corundophyllite. Chester.

The author obtained the species at Chester and sent a specimen to Professor Shepard, asking if it was his corundophyllite. On being informed that it was he then analyzed the specimen. It proves to be both chemically and physically a chlorite of the variety ripidolite.

Analysis.

SiO_2	25.06
Al_2O_3	30.70
FeO	16.50
MgO	16.41
H_2O	10.62
	99.29

J. L. Smith: Emery mine at Chester, ibid., Vol. XLII, p. 92.

1866. Chloritoid. Chester.

An analysis given under the name chloritoid, which is criticised by Dana as incorrect.

C. T. Jackson: Am. Jour. Sci., 2d series, Vol. XLII, p. 107.

1866. Corundophyllite. Chester.

In a letter Professor Shepard claims that the true corundophyllite is that from Asheville, N. C. He has, however, published the mineral at Chester as corundophyllite.

J. D. Dana: Ibid., p. 269.

1866. Corundophyllite.

Admits the chloritoid of Jackson and the clinochlore of Smith to be clinochlore. The mineral attached to the fringe rock, and analyzed by Professor Smith and found to be biotite, he now claims to be corundophyllite, as it has H.=1.5; inelastic; sp. gr. 2.76. Before the blowpipe it hardens, and melts with difficulty.

C. U. Shepard: Ibid., p. 421.

1867. Corundophyllite. Chester.

Is clinochlore, optically.

J. P. Cooke: Some American chlorites; Am. Jour. Sci., 2d series, Vol. XLIV, p. 206.

1867. Corundophyllite.

"Corundophyllite is a clinochlore in plates or crystals; bisectrix positive, inclined."

Des Cloizeaux: Letter to Prof. J. D. Dana; ibid., pp. 258, 283.

1868. Corundophyllite. Chester.

Analysis by Prof. J. H. Eaton. Column No. 1, crystals with diaspore, rutile, and sapphire. No. 3, fringe rock. No. 2 is by Pisani. Professor Shepard states that he supplied the same material for Nos. 1 and 2.

	No. 1.	No. 2.	No. 3.
SiO_2	24.77	24.0	24.69
Al_2O_3	25.52	25.9	28.52
MgO	21.88	22.7	21.86
FeO	15.19	14.8	16.38
H_2O	11.98	11.9	[1]
	99.34	99.3	

[1] Not determined.

C. U. Shepard: Ibid., Vol. XLVI, p. 257.

Analysis No. 3 of the fringe rock is also corundophyllite, with probably a slight error in the Al_2O_3 determination. It is very different from the analysis of the fringe rock, by J. L. Smith, which is given under Biotite, 1866.

1891. Corundophyllite. Chester.

In an elaborate work upon the chlorites, Professor Tschermak describes the mineral fully and determines its optical characteristics. His results are made the basis of the description of the mineral by E. S. Dana in the new edition of the Manual of Mineralogy.

G. Tschermak: Die Chloritgruppe; Sitzungsberichte d. Akad. Wien, XCIX, p. 210.

1894. Corundophyllite. Chester.

The mineral is uniformly the oldest in the veins in magnetite, in which it occurs, and where it is not covered by later growths forms surfaces of hexagonal prisms, tapering by irregular steps from the larger attached end. It is followed by rutile, corundum, anorthite, diaspore, margarite, and calcite. Its growth continues in lessened degree through this series, small crystalline plates being perched upon the corundum blades or wholly inclosed in calcite, where it is followed immediately by margarite; broad sheets of it run up between the lamina of the margarite. Some very beautiful crystals of dark-green color are capped by colorless or pale aquamarine colored heads. The transition is sudden, and the prisms below have colorless centers. The heads have perfect faces, in forms like fig. 7, p. 645, in the new edition of the System of Mineralogy (E. S. Dana), and, like it, are divided into irregular twinned segments. They are almost uniaxial. I can not distinguish these pale-green forms from amesite (q v.), and I have noted the apparent passage of the one mineral into the other. The material seemed perfectly fresh.

CORUNDUM.

1865. Emery. Chester.

First announcement with description and analyses. Considers it a distinct species. FeO,Al_2O_3.

C. T. Jackson: Am. Jour. Sci., 2d series, Vol. XXXIX, p. 87.

1865. Corundum. Chester.

White massive corundum in veins one-half inch wide occurs traversing massive emery. The latter mineral at Chester is exceedingly uniform in composition and may be regarded as an aluminate of protoxide of iron; FeO,Al_2O_3.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XL, p. 123.

1865. Corundum. Chester.

Rare; only in seams one-half to three-fourths inch thick, though many 1 foot square; grayish white, highly crystalline, like that from the Carnatic; in granular and compact emery.

C. U. Shepard: Report of Chester emery mine, p. 9.

1865. Emery. Chester.

(*a*) No perfect crystals; coarsely massive or in large separate individuals up to one-half inch across; perfect cleavage and striæ; reddish-brown with faint coppery luster; 0.5, higher sp. gr. than corundum; abrading power $\frac{1}{2}$; magnetic, FeO,Al_2O_3.

(*b*) Granular, flattened grains one-eighth to one-half inch in corundophyllite; formed from fusing of grains.

(*c*) Compact, very fine grained, tough, massive, harsh dark-brown, faint violet-blue tarnish in wedge-shaped, contorted masses or elliptical balls 5 to 10 inches across.

(*d*) Emery magnetite, massive magnetite, containing emery harder and tougher than magnetite, and has purple tarnish.

(*e*) Stony emery—the general substance of the vein, or the chloritoidal rock—slaty, tough, greenish-gray, very heavy, 10 to 20 per cent emery.

C. U. Shepard: Report Chester emery mine, pp. 6–8.

1865. Emerite. Chester.

"And he (Dr. Jackson) has suggested that it be considered a distinct species in place of being included under corundum. (Note.—Should it hereafter be found proper to separate emery from corundum, the name emerite ought not to be an unsuitable designation for the new species.) His conclusion would obviously be acquiesced in were it not for the strong resemblance in striæ and cleavage between the emery and common corundum, making it impossible for us to separate the substances crystallographically from one another. It would, however, be singular if two minerals differing so widely in their other physical qualities should be specifically identical."

C. U. Shepard: Report Chester emery mine, p. 6.

1866. Emery.

Dissents from the opinion of Messrs. Jackson and Shepard that emery is a separate mineral and gives several analyses:

	Poor.	Better.	Prepared.	Crystals.	After HCl and H_2O.
Al_2O_3	44.01	50.02	51.92	74.22	84.02
Fe_2O_4	50.21	44.11	42.28	19.31	9.63
SiO_2	31.30	3.25	5.46	5.48	4.81

H. Lawrence Smith: Am. Jour. Sci., 2d series, Vol. XLII, p. 83.

1866. Sapphire. Chester.

In dolomite veins, at Chester emery mine.

C. T. Jackson: Proc. Bost. Soc. Nat. Hist., Vol. XVI, p. 32.

1868. Corundum. Chester.

Occasionally in blue bipyramidal crystals.

J. D. Dana: Sys. Min., p. 139.

1870. Corundum. Pelham.

Nodules of brownish-black mica superior in hardness to the surrounding mineral contain nodules of corundophyllite, which inclose a white corundum often streaked with a deep sapphire-blue; rare

J. H. Adams, October, 1870: Am. Jour. Sci., 2d series, Vol. XLIX, p. 271.

(The "corundophyllite" is biotite.)

1881. Emery and iron. West Worthington.

"Abram Granger's 50-acre pasture lot. Local geology," No. 2.

Chauncey Stephenson: Hampshire Gazette, November 29, 1881.

(The writer sent me some hornblende-schist as a sample of the emery.)

1885. Emery. Chester.

In veins in the magnetite showing the paragenesis—magnetite, corundophyllite, rutile, corundum, diaspore, calcite. The corundum occurs in flat blades partly white, partly deep blue, or rarely pink, which appear on dissolving the calcite and which at times are attenuated to blue threads running up into the calcite after the manner of graphic granite. The plates polarize in bright color and are very flat, distorted rhombohedra.

1886. Corundum. Hampden mine.

Report for 1880: Capital, real and personal, $310,000; total hands employed, 31 (1 boy, 11 men below ground); amount of wages, $9,347; boiler, 1; engine, 1; horsepower, 10; drainage machines, 2; hoisting machine, 1; fuel, cords of wood, 365; explosives, cost, $254; value of all materials, $4,572; product, tons, 600; value, $18,000.

Tenth Census, Vol. XV, 1886, p. 840.

1886. Corundum. Chester.

The finest piece of deep-blue massive corundum from the Chester mine is in the collection of the late Mr. Ames, of Chicopee. It is a large fragment from a vein 12 mm. in thickness.

1896. Corundum. Pelham.

Crystals 1 to 1½ inches across, 2 inches long; from colorless, with spots of deep blue, to complete deep-blue color; gray, granular masses as large as one's fist; crystals deep blue in tourmaline and in andesite, but more commonly in a thick band of deep bronzy biotite bordering olivine rock. So much has been found by Mr. B. F. Merrill, who has done much for the mineralogy of the locality, that many bags have been sold for crushing. The finest mass was 6 inches long by 3½ inches wide. It was a single crystal, but with rude outer faces and in cross section showed alternate hexagonal bands of rich blue and gray a half inch wide. It was penetrated by a crystal of allanite a half inch square and an inch long, and the corundum is puckered radially from the allanite for the space of an inch; so that when broken across it has a most remarkable fibrous radiated structure surrounding the broken end of the allanite crystal. The perfect glassy and lustrous cleavage surface of the corundum crystal is continued up to the border of the radiated fibrous or puckered area, and is within this area replaced by a small conchoidal, quartz-like fracture. The specimen is in the collection of Amherst College.

COTUNNITE.

1866. **Cotunnite.** Southampton lead mine.
C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 247.
(This is anglesite.)

CUMMINGTONITE.

1824. **Cummingtonite.** (Dewey.) Cummington.
See Amphibole.

1860. **Cummingtonite.** (Rammelsberg.) Cummington.
See Rhodonite.
The first use of the word for the ferruginous actinolite is now established.

CUPRITE.

1835. **Red oxide of copper.**
Mentioned as occurring in new red sandstone and trap, but no locality given.
E. Hitchcock: Am. Jour. Sci., 1st series, Vol. XLVII, p. 323; Geol. Mass., p. 225.

1843. **Red oxide of copper.** Whately.
Coating specimen of native copper.
E. Hitchcock: Am. Jour. Sci., 1st series, Vol. XLVII, p. 323.

1882. **Cuprite.** Deerfield.
In minute octahedra superficially altered into malachite; occurs on datolite in fissures of diabase.
B. K. Emerson: Deerfield dyke and its minerals; ibid., 2d series, Vol. XXXIV, p. 280.

CYANITE.

1818. **Cyanite or sappare.** Deerfield.
In mica-slate; discovered by Dr. S. W. Williams.
E. Hitchcock: Geol. of Conn. River; Am. Jour. Sci., 1st series, Vol. I, p. 114.

1820. **Sappare.** Chesterfield.
Near line between Conway and Deerfield, a few miles east of the village of Conway.
A. Eaton: Index, p. 145.

1823. **Cyanite.** Chesterfield, Granville, Plainfield.
Chesterfield, in loose masses in mica-slate, where its bladed or imperfect prisms are 2 feet long (Hunt). Granville (Dewey), Plainfield (J. Porter).
E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 219.

1823. **Kyanite.** Chester and Chesterfield.
Very dark, in mica-schist.
J. Porter: Loc. Min., ibid., p. 248.

1824. **Cyanite.** Chester or Norwich.
"A curious variety occurs here in very fine, soft mica-schist resembling potstone, often in hemitrope crystals; color grayish blue."
E. Emmons: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VII, p. 254.
(The locality is uncertain, because he has mentioned Norwich in the sentence before and was writing from Chester. The description of the rock agrees best with Chester. I have, however, found the grey variety abundant in the sericite-schist just south of Chester.)

1824. Cyanite. Chester.

In common mica-schist. A darker variety than the common in dark mica-schist, generally in single prisms (Emmons). Blandford, Granville.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 40.

1825. Cyanite. Near Westfield.

Abundant to the north and west of the village of Westfield—the green and blue varieties; green in quartz and blue in mica-schist; blue not perfect crystals.

Emerson Davis: Min. Loc.; ibid., Vol. IX, p. 252.

(This refers to the towns mentioned above. The mineral does not occur in Westfield except along the west line.)

1825. Kyanite. Cummington.

Rare, large, well-defined crystals in mica-slate, with garnet, quartz, and black mica.

J. Porter: Min. Loc.; ibid., Vol. IX, p. 55.

1825. Cyanite. Conway, Chesterfield, Chester, Cummington, Blandford, Granville, Middlefield, Plainfield.

S. Robinson: Cat. Am. Min., p. 37, ff.

1827. Cyanite. Chesterfield.

Crystals azure-blue, 18 inches long, 2 to 3 inches broad.

A. Nash: Lead veins of Hampshire County; Am. Jour. Sci., 1st series, Vol. XII, p. 241.

1828. Sappare. Chesterfield.

One mile north of meeting-house, on land of Mr. Searle. In veins in bowlders of mica-schist; doubtless is in place below; not good specimens now. Mr. Searle usually keeps a supply on hand to furnish travelers.

E. Hitchcock: Min. Loc.; Am. Jour. Sci., 1st series, Vol. XIV, p. 216.

1835. Sappare. Chesterfield, Blandford, Worthington, Middlefield, Deerfield.

E. Hitchcock: Geol. Mass., p. 345.

1835. Rhœtizite. Blandford and Russell (Emmons).

Ibid.

1844. Kyanite. (*Epimecius cyaneus.*) Chesterfield, Worthington, Blandford.

J. D. Dana: Sys. Min., p. 375.

1844. Cyanite. Chesterfield.

Analysis.

SiO_2	42.56
Al_2O_3	57.00
Loss	.44
	100.00

Same as fibrolite (Vanuxem).

F. Alger: Alger's Phillips Min., p. 108.

1866. Kyanite. Northfield. On Northfield Mountain, road to Erving.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 248.

1877. Cyanite. Blandford, Russell.

North Blandford road, in hydromica-schist. South of Blandford Centre on West Granville road, between two brooks.

Russell, west of river on bank just below the old railroad bridge. Large crystals, gray, in schist; 100 by 25 mm.; fine blue in small segregated granite vein adjoining.

1882. **Cyanite.** Worthington.

On the old Rufus Smith farm, now owned by Spencer Stewart, 3 miles southwest of center. Also in ledge where Rev. Mr. P. W. Lyman has blasted it out, 40 rods southeast of R. Smith's house; also one-half mile west of this house in bowlders.

1882. **Cyanite.** Northfield.

Deep rich blue in single crystals and fibrous gray; top of gulf road, where it goes down to Erving.

W. E. Webster's collection, Northfield.

1883. **Cyanite.** Chester.

In fine large mass in bowlder about one-half mile southwest of Chester Center.

E. J. Whitaker, class of '83, Amherst College.

1890. **Cyanite.** Chesterfield.

"Cyanites were found in the early part of the century at Chesterfield, Mass., where some of the finest mineralogical specimens were obtained. An example of these, a mass measuring 10 by 6 inches, and consisting of distinct crystals over 3 inches long, piled one upon another, is in the British Museum at South Kensington, in London. The crystals are all distinct, of a fine blue color, and would cut into small mineralogical gems."

G. F. Kunz: Gems and precious stones of the U. S., p. 176.

CYMATOLITE.

MUSCOVITE-ALBITE PSEUDOMORPHS.

1825. **Talc.** Goshen.

With the rose mica occurs "a beautiful white talc, which I believe has not been credited to this locality."

E. Hitchcock: Am. Jour. Sci., Vol. IX, p. 21.

1867. **Cumatolite.** Goshen.

"Cumatolite (Kuma, Gr. a wave, from its undulating surface. H. =1.5. Gr. =2.74.) Occurs in long prismatic forms, seemingly the continuations of spodumene crystals, of which they constitute (at one end) about half the length. Cleavage micaceous in one direction, which is constantly intermediate between the two perfect prismatic cleavages of the contiguous spodumene. There is no blending of the two minerals, but simply a contact where the two crystals meet. Color white, luster pearly or that of satin. Thin laminæ transparent, inelastic. No appearance of having resulted from decomposition or metamorphosis of spodumene. Both minerals are perfectly fresh and lustrous throughout. Gives off no moisture or fluorine by heat. Before the blowpipe is nearly infusible except at the thinnest points, which only become rounded. Slowly dissolved by borax into a clear glass; with soda gives when cold an opaque white one. Cobalt produces an intense blue. No reaction of lithia, even when fused with bisulphate of potash. Scarcely attacked by acids. Fuses with carbonate of soda into a colorless mass, which gave about two-thirds silica, abundance of alumina, and not more than 1.5 per cent lime, with traces of magnesia. Neither potash nor soda were sought for. Found at the indicolite locality in Goshen, Mass.

"C. U. SHEPARD.

"AMHERST COLLEGE, *May 24, 1867.*"

C. U. Shepard: Private publication.

1867. **Cumatolite.** Goshen.

Correspondence with Prof. J. D. Dana, May 24, 1867; quoted in Dana's Sys. Min., p. 455.

1868. Pihlite. Goshen, Norwich.

Analysis by B. S. Burton. Cymatolite quoted as a synonym (Dana's Sys. Min., p. 455), with changed spelling.

"The locality (Norwich) is a mistake, as Professor Shepard says he found it only at the Barrus locality in Goshen."

A. A. Julien: Ann. N. Y. Acad. Sci., Vol. I, p. 327.

1871. Cymatolite. Chesterfield.

Analysis (imperfect and retracted) in the article "Spodumene and its alterations," p. 327; occurs in a quartzose segregation of a granite vein on a supposed new mineral from Chesterfield.

A. A. Julien: Am. Chem., Vol. I, p. 300.

1877. Cymatolite. Goshen.

Crystals 2 inches long in bluff north of Lily Pond.

1877. Aglaite. (A. A. Julien.) Chesterfield.

"A new mineral species with interesting relations to pihlite and cymatolite." Name proposed and analysis given the same as below, except that the water is given as 3.01, part of which is below assigned to organic matter.

A. A. Julien: Eng. and Min. Jour., Vol. XXIII, p. 217.

1879. Cymatolite. Goshen.

A preliminary notice in which the author restores the original name, cymatolite, but retains the name aglaite for the peculiarly brilliant and micaceous variety found at Goshen.

Analysis.

SiO_2	58.11
Al_2O_3	24.38
Fe_2O_3	1.66
MnO	.18
MgO	.75
CaO	.48
Li_2O	.09
Na_2O	2.57
K_2O	8.38
Organic matter	.43
(?)	2.58
	99.61

A. A. Julien: On the composition of the cymatolite from Goshen; Am. Jour. Sci., 3d series, Vol. XVII, p. 398.

(This small, micaceous variety found at Goshen was exactly the original cymatolite of Shepard.)

1879. Cymatolite. Goshen. Chesterfield.

Goshen; on the Manning farm; impure yellowish. On the Barrus farm, variety aglaite, always in continuation of (never as a crust on) the prisms of spodumene; with flat micaceous structure. At Chesterfield Hollow, Chesterfield, in crusts, often of large size, of fibrous micaceous structure, with wavy cleavage. A series of analyses of both the Goshen and Chesterfield mineral and a most elaborate discussion of its chemical formula are given; then a microscopical description follows. "The fibers of cymatolite seem to spring from those of the spodumene," or rather of the killinite, which latter seems to occupy the position of the β— spodumene of the next article by Brush and Dana. (See p. 346 of this article, and figures.)

A. A. Julien: Spodumene and its alterations; Ann. N. Y. Acad. Sci., Vol. I, p. 327.

1879. **Undetermined pseudomorph.** West Chesterfield.

Pseudomorphs after spodumene rather indistinct.

A. A. Julien: Spodumene and its alterations; Ann. N. Y. Acad. Sci., Vol. I, p. 349.

1879. **Albite after spodumene.**

This form, generally mixed with a little muscovite and less quartz, is a mere variety of the albitic granite below, and is rarer than the variety where muscovite prevails to the exclusion of the other constituents.

A. A. Julien: Ibid., p. 349.

1879. **Albitic granite after spodumene.**

The pseudomorphs, most conspicuous in size, even more so than those of cymatolite, consist of a vein granite made up of muscovite, albite, and quartz in varying proportions even within the same pseudomorph, with manganese, garnet, œrstedite, beryl, etc., occasionally interspersed.

The large cymatolite columns generally pass at one end into mixtures of this character, and enormous masses of 1 or 2 hundredweight have been formed. They consist of an aggregation of perhaps only two or three pseudomorphs of this kind, rudely, but in places distinctly, shaped, each from several inches to nearly a foot in diameter, and from 1 to nearly 3 feet in length. Various transitions were observed in the deposition of these materials, such as huge pseudomorphs of which a large core consisted of a coarse aggregate of mica crystals with an outer crust, one-half inch thick, of cymatolite; in other cases of grayish-white quartz.

The chemical explanation of this change seems to be: "A splitting up of two molecules of the bisilicate spodumene by a simple transference of two atoms of silica from one to the other into one molecule of muscovite and one of albite, the lithium being replaced by potassium or sodium out of the solution during this change. This may be represented: Two molecules spodumene, 1 molecule muscovite, 1 molecule albite, $R_4Al_4Si_8O_{24}=R_2Al_2Si_2O_8+Na_2Al_2Si_6O_{16}$."

A. A. Julien: Ibid., p. 348.

1880. **Cymatolite.**

The supposed mineral is proved to be an intimate mixture of albite and muscovite. The spodumene changes into "β—spodumene," a pegmatitic mixture of albite and a new mineral, eucryptite, which latter has changed into muscovite. The cymatolite is thus a cryptocrystalline albitic granite.

G. J. Brush and E. S. Dana: The spodumene of Branchville; Am. Jour. Sci., 3d series, Vol. XX, p. 267.

1892. **Cymatolite.**

"The cymatolite from Goshen was earlier (Eng. Min. Jour., XXII, 217) called aglaite by Julien."

E. S. Dana: Min., 368.

(This should read "Chesterfield" for "Goshen," "XXIII" for "XXII," and "later" for "earlier" since cymatolite was published ten years earlier than aglaite.)

DAMOURITE.

See Muscovite, 1846.

DATOLITE.

1876. **Datholite.** Greenfield.

C. U. Shepard: Cat. of Min., within 75 miles of Amherst College, p. 4.

1882. Datolite. Deerfield.

The datolite is second only to prehnite in abundance at the new cutting, and surpasses all the minerals occurring here in beauty, perfectly pellucid crystals up to 12 mm. long being not uncommon, and many of the same showing a great range of rare faces and curious and perplexing distortions. It occurs also in thin veins, developing no crystals on the north side of the river and rarely in the amygdules in the light-gray diabase. The mineral fills the veins often completely with a white saccharoidal deposit from 10 to 50 mm. thick, with only here and there cavities in which fine crystals have come to development. It rests sometimes upon the trap itself, which is there quite fresh, and where slickensides occur they are of light-gray color, due to the mixture of datolite and trap, without the appearance of any of the chloritic or serpentinous products of decomposition which darken the same formation in the prehnite. More commonly it rests upon a thin layer of massive prehnite, rarely with several alternations of datolite and prehnite in calcite or upon the thick layers of spindle-shaped crystals of the former mineral, where the separate attached crystals reach the greatest perfection. The crystals of datolite, which resemble those of Farmington in their glassy clearness and general habit, are remarkable for the great number of faces represented and for the distinctness of the types into which they are grouped, as well as for the manifold and intricate forms produced by the unique development sometimes of single faces and sometimes of all the faces on one side of the vertical plane.

The following is a list of all the forms presented, arranged according to the table given by E. S. Dana[1]: i-i (a), i-$\dot{i}$ (b), 0 (c), I (M), i-$\dot{2}$ (o), i-$\dot{3}$ (l), 1-i (u), — $\frac{1}{2}$-i (v),— (x),— (s), 4-i (II), 2-i (ξ), $\frac{1}{2}$-$\dot{i}$ (Ω), 1-$\dot{i}$ (σ), $\frac{1}{3}$-$\dot{i}$ (t), 2-$\dot{i}$ (g), 4-$\dot{i}$ (m),— 4 (n), 2 (ε), $\frac{1}{3}$ (λ), 1 (μ), $\frac{1}{5}$ (κ), — 6-3 (q), — 4-2 (ϑ), 4-2 (Θ), 12-$\frac{3}{2}$ (π),— 16-$\dot{2}$ (R), — 8-$\dot{2}$ (β),— 4-$\dot{2}$ (Q),— $\frac{8}{3}$-$\dot{2}$ (U),— 2-$\dot{2}$ (γ), 2-2 (T), $\frac{8}{3}$-$\dot{2}$ (i), 8-$\dot{2}$ (B), $\frac{8}{5}$-$\dot{2}$ (C), [new], $\frac{3}{2}$-$\dot{3}$ (E), $\frac{5}{2}$-$\dot{3}$ (F), $\frac{5}{2}$-$\dot{5}$ (K), $\frac{9}{4}$-$\dot{9}$ (G).[2]

For convenience of description the crystals may be divided into three types:

I. *The regular.* In this almost spherical forms are produced by the equal development of a large number of faces. In one crystal x, ε, m were slightly larger than the rest; a, M, n, o, β, Q, equally developed; c, q, B, very small.

Another very stout, prismatic and resembling the Andreasberg crystals somewhat in the distribution of its faces, except that the elongation in the direction of the clinodiagonal axis was only slight, had the faces x, ε, λ, g, m, largest; ii, M, —4, β, Q, O, μ, $i\dot{i}$, about equal; u, r, q, ϑ, ξ, o, π, a, x, smaller.

A third was formed by the nearly equal development of a, x, g, m, ε, λ, μ, M, o, n, β, B, with O, s (— 6 i) q, and γ subordinate.

A fourth minute but very beautiful crystal was unique for this locality in having the face o large and square and ii elongated vertically, the faces g, m, u, x, a, n, M, ε, λ o, β, Q, U, a, about equally large, ξ, q, μ, i, F small.

Several of the larger crystals of this type showed a new face in the zone λ ($\frac{1}{3}$), g (2-i), and o (i-2), c (O) $\frac{8}{5}$-2, to which I have in the preceding list applied the letter C.

II. *Prismatic type.* By the great enlargement of x and two opposite faces of m a prism of 116° is formed, elongated in the direction of the axis of the zone x, o, m, the sharp edges of which are beveled by n and o elongated into narrow planes. The other planes are grouped in a very confusing

[1] Tsch. Min. Mittheil., 1874, p. 5.

[2] This list has been corrected, as several misprints occurred in the original from lack of proof reading.

1882. **Datolite**—Continued.

way around the ends of this prism. The uniform dullness of the face *x* is a characteristic feature.

The crystal under this type which was richest in faces showed the following combination: *a*, *b*, *c*, M, *o*, *x*, *y*, *m*, *n*, *ε*, *λ*, *μ*, *q*, *β*, Q, U, B, *a*, *i*; another lacked the faces *b*, *k*, and those in the zone B, *o*, *β*. Other crystals showed the faces R, *π*, and *r* in traces.

III. *The tabular type.* The roughened faces of *x* are large and nearly circular and approached so as to reduce the crystal to a thick plate, around the edge of which the other faces are placed. The crystals of this type resemble closely the Haytorite pseudomorphs, some of them having the same faces in the same relative development as in the latter, others being even richer in forms than any I have seen described from the Haytor mine.

One crystal contained twenty-eight distinct forms, several only as fine lines, but all capable of quite close measurement. The crystal was peculiar in having the face *a* striated in two directions, forming a series of V's, as is common with the face *o* from other localities. The latter face is here finely polished.[1] The forms present were *a*, *c*, M, *o*, *u*, *ś*, *Π*, *ξ*, *Ω*, *σ*, *γ*, *m*, *n*, *ε*, *λ*, *μ*, *x*, *g*, *θ*, *β*, Q, U, *a*, B, E, F, K, G. Another crystal of this type went to the extreme of simplicity, being bounded by the faces *a*, *c*, M, *o*, *ξ*, *g*, *m*, *n*, *ε*, *λ*, *μ*, *q*, all quite large except *q* and O, and the face *ξ* unusually large and shield shaped.

Similar tabular forms have been recently described from the spheres of chalcedony from Theiss in Tyrol.[2]

Inclosures in datolite. Calcite. When the datolite is thrown in acid, much calcite is dissolved and a vesicular mass left; and similar pieces are found in the vein itself, showing that the same operation has been performed by natural agencies.

Selenite? Barite? In the thick veins the minerals are often abundantly gashed by the removal of broad, thin blades of some mineral, possibly selenite or barite, and the surfaces drused over by minute, very distorted crystals of datolite.

Axinite. Some of the finest crystals of axinite occur in the datolite. The crystals are here sometimes short, stout prisms.

Prehnite. Small portions of prehnite are inclosed rarely in the lower portion of the datolite; also small patches of the chloritic mineral identical with that derived from the decomposition of the former.

B. K. Emerson: The Deerfield dyke and its minerals; Am. Jour. Sci., 3d series, Vol. XXIV, p. 352.

1882. **Botryolite.** Deerfield.

One cavity of the trap large and nearly globular, with vesicular walls, was filled with datolite, which was compact within the vesicles of the trap, but above was fine-granular, like loaf sugar, and much gashed, and at the surface coated with a layer of small botryoidal or globular botryolite, which would have been taken for hyalite if it had not proved fusible with green flame before the blowpipe.

Ibid., p. 355.

1888. **Datolite.** Deerfield.

Dr. O. Luedeke: Ueber Datolith, eine mineralogische Monographie; Zeit. für Naturwissenschaften, Vol. LXI, p. 235.

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[1] This striation was apparently parallel to the intersection edges which the face *a* produced would make with *o* and *i*–$\bar{1}$.

[2] C. Vrba, Zeitsch. Kryst., Vol. V, p. 425.

1888. **Datolite.** Cheapside, north side of Deerfield River. Northampton.

In changing the location of the Fitchburg Railroad, a deep cutting was made in the Deerfield trap directly opposite the above locality and on the same sheet, separated only by the width of the river. Many large cavities of fine crystals were found. The locality differed markedly from the one on the other side of the river, as datolite was here the only mineral. The crystals were often larger than at the other locality, generally of the regular type and not quite so transparent, and showed a faint green tint.

DELESSITE.

See Diabantite.

DEWEYLITE.

1826. **Deweylite.** Middlefield.

Emmons: Man. Min. and Geol., p. 134.

1835. **"Deweylite?"**

In serpentine in Russell, on bank of Westfield River, one-half mile north of serpentine location in Westfield.

E. Hitchcock: Geol. Mass., p. 370.

This was probably the bastite from the Atwater quarry.

1835. **Kerolite.** Middlefield.

"The compact variety, deweylite (Emmons), at Middlefield in seams and irregular veins. Pseudomorphoses after quartz of considerable dimensions and of grayish-white color."

C. U. Shepard: Min., 1st edition, Part II, Vol. I, p. 292.

1841. **Deweylite.** Russell, Middlefield.

E. Hitchcock: Geol. Mass., p. 618.

1852. **Kerolite (Deweylite).** Middlefield.

C. U. Shepard: Min., 3d ed., p. 146.

1876. **Deweylite.** Middlefield.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 3.

1883. **Deweylite.** Middlefield.

Under the microscope a delicate micro-botryoidal and laminated structure, wholly amorphous and winding in sheets among the remains of the serpentine, in which and from which it is formed.

DIABANTITE.

1818. **Green earth.** Deerfield.

Small quantity in amygdaloid.

E. Hitchcock: Geol. Deerfield dyke and its min.; Am. Jour. Sci., 1st series, Vol. I, p. 113.

1823. **Chlorite.** Deerfield, Greenfield, Gill.

In greenstone amygdaloid; it fills two-thirds of the cavities in some varieties of greenstone, and to the naked eye has a radiated aspect, but Professor Dewey remarks that it does not appear to be radiated under a magnifier, great or small, but to consist of folia curiously arranged, often with no regularity, their length somewhat greater than their breadth.

Green earth.—"A part of the chlorite described above appears to belong to this species."

E. Hitchcock: Geol. Conn. River: ibid., Vol. VI, p. 28.

1826. **Radiated chlorite.**

With chlorophæite.

E. Hitchcock: Ibid., Vol. X, p. 393.

1841. **Chlorite.** Greenfield, Deerfield, South Hadley, Northampton, West Springfield.

"A dull-green foliated mineral, which appears to be chlorite. The folia have in general a radiated structure and sometimes invest calcareous spar. A little below Turners Falls, in Gill, just at the mouth of Fall River, on the east bank, is the best locality of this mineral with which I am acquainted. More frequently the cavities are occupied by earthy chlorite * * * along the east side of the ranges of greenstone."

E. Hitchcock: Geol. Mass., p. 660.

1876. **Delessite.** Greenfield (Turners Falls).

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 4.

1882. **Diabantite.** Turners Falls, Springfield.

The chloritic mineral, so uniformly and abundantly disseminated in the diabase of the valley, was entered in the catalogue of the State collection by Dr. Hitchcock as foliated chlorite, Turners Falls, and a paler pulverulent variety, as earthy chlorite, Springfield. That the mineral is chemically identical with that analyzed by Hawes, and named diabantite by him, is extremely probable in view of their identity in all physical and especially optical properties, and of the monotonous similarity of the many diabase dikes of the Connecticut basin, in which both occur. That the mineral is distinct from delessite, as the word is used by Zirkel, Rosenbusch, and Heddle, is much less certain.

It is the earliest product of the decomposition of the diabase, and proceeded doubtless from the alteration of the augite. In one case I found a mass having the shape of an augite crystal filled with magnetite toward the outside and polarizing as a single individual, but possessing the bright-green color and the strong dichroism of diabantite. It is disseminated in comparatively small amount through the mass of the rock between the feldspar crystals, and thus in the place of the augite, much more abundantly in the steam cavities and shrinkage cracks with which the rock abounds. It generally coated the empty amygdaloidal cavities first with a quite thick ($\frac{1}{2}$–1 mm.) foliated-radiated layer with minute, delicate botryoidal surface. Several such layers sometimes followed each other, and then the center became filled with a confused granular mass of the same material, the whole making a very pleasing effect under the microscope with its bright-green color and striking dichroism. Under crossed nicols this central granular portion often assumes a deep chlorite green studded with bright colorless spots (calcite?), and maintains this color through a whole revolution of the object, the bright spots being alternately extinguished. Sometimes, in the gray mottled diabase, a layer of magnetite was interposed between the layers of diabantite, and rarely large distinct crystals of magnetite appear wholly surrounded (in section) by diabantite, and in one case a fine large feather of magnetite projected into the diabantite. The long feldspar crystals, also, which border the cavity, often project freely into it and are then perfectly and more complexly terminated than when in the mass. The diabantite folds around and does not penetrate them. Often the center of the cavity is filled with calcite, impregnated with diabantite, so as to produce a pegmatitic appearance on cleavage faces, or with finely fibrous prehnite, and this also is for a greater or less distance toward the center blackened by the abundance of the diabantite which it has inclosed.

1882. **Diabantite**—Continued.

On the other hand, where over the botryoidal layer of diabantite there appear quartz, datolite, natrolite, sphalerite, or other sulphurets, they are entirely free from this impregnation. In the broad mineral-bearing fissures the diabantite often impregnates layers of scaly or fibrous prehnite 1 to 5 mm. thick over considerable surfaces so that a black or blackish-green mass results, often abundantly slickensided, which so resembles a very fine-grained scaly or fibrous schist that I supposed it to be formed by the pulverizing of the trap by friction and the cementing of the powder by prehnite, until the microscope made known its true character.

Farther north, on the dike opposite Turners Falls, the large flattened cavities are lined with a botryoidal layer, 1 mm. thick, of black-green diabantite, with crystals of chalcopyrite, blende, and albite upon it. The interior is very often filled with a dark olive-green fine-granular mixture of crystals of diabantite, which can be shaken out of the cavity as a fine powder, each grain of which appears, under the microscope, as beautifully vermicular as the helminth of the older rocks.

The paragenesis of the mineral is thus quite definitely fixed. It was the first product of the decomposition of the diabase, and its formation ceased not very long after calcite and prehnite began to be deposited in the cavities and fissures. As the formation of the latter minerals was attended by quite energetic decomposition of the trap, the formation of the diabantite, occurring still earlier, may well have been promoted by the increased chemical activity of the waters during the cooling of the trap after its solidification. The mineral seems to me plainly of secondary formation, and I can see no good ground for thinking that it was formed and deposited where we find it during the rise of the lava through the sandstones. The cavities flattened and fluidally arranged in the lower part of the mass, with well-terminated feldspars projecting into them, and growing very abundant and graduating into long vertically placed tubes in the upper portions, have certainly been formed by steam and can not have been filled till after solidification of the rock. This is much more certainly the case with the broad fissures that extend across the whole dike, which seem for a time to have furnished a passageway for boracic-acid springs, and in which the diabantite must have been formed much as were the calcite and prehnite that it has impregnated. The filling of the cavities also with several concentric and botryoidal layers, sometimes separated by calcite, would indicate slow deposition from water.

The great amount of protoxide of iron in the mineral does not seem to me to need for its explanation the assumption that it is an original constituent of the rock. The waters brought up in the lava, on becoming liquid, or the waters which reached the bed after percolating through the bituminous sandstones of the valley, may have been deprived of oxygen and able to exert strong solvent activity, without peroxidizing the iron of the augite. In discussing a mineral which seems to be identical with our diabantite and which forms the first coating of the amygdules of the phillipsite-bearing feldspar basalt of Salesl, Von Zepharovich[1] derives the same from sphærosiderite, the radiated and concentric structure and the botryoidal surface resembling in miniature that common in the carbonate. A cellular structure and traces of rhombohedral forms were also observed. I have seen here no traces of any such crystal forms. The cellular or excavated structure occurs frequently and can be produced in fresh specimens by acid, by the removal of calcite. The occurrence of the mineral in fresh prehnite and calcite would militate against its being here a pseudomorph after siderite.

[1] Zeitsch. Kryst., Vol. V, 1880, p. 98.

1882. **Diabantite**—Continued.

Products of the decomposition of diabantite.—From its great content of ferrous oxide the mineral is very prone to decomposition, and in sections cut near the weathered surface of the rock its color has become red-brown, its strong dichroism is gone, and it shows only the faintest aggregate polarization. Sometimes a cavity shows the exterior changed and brown, the interior bright-green, with sharp lines of demarcation. In the large amygdules, masses of gold or bronze yellow, sometimes light straw-yellow, can be obtained, which exfoliate voluminously under the blowpipe, and then by a sharp explosion throw off the foliated portion and begin the operation anew. It is a *diabantite vermiculite*. At the end of this series of changes only a small quantity of limonite remains.

When a slide of the diabase is treated with hydrochloric acid, both the fresh and the altered diabantite are decomposed and white silica remains behind in plates having still the shape and arrangement of the original mineral. This is also the case with the vermiculite out of the crystalline rocks in Pelham.

Similar amygdules occur in the compact diabase, having a white color or being in part still green and dichroic, and having exactly the arrangement of the diabantite. These are silica, I have no doubt, and have been produced by some natural process analogous to the artificial one employed above. The white portions show marked aggregate polarization in white and black, but without bright colors.

B. K. Emerson: The Deerfield dyke and its minerals; Am. Jour. Sci., 3d series, Vol. XXIV, p. 198.

DIALLAGE.

1823. **Diallage.** Conway? Granite.

E. Hitchcock: Geol. Conn.: Am. Jour. Sci., 1st series, Vol. VI, p. 227.

(This was possibly zoisite.)

1824. **Diallage.** Chester, Middlefield.

Chester, in diallage rock? Resembles metalloidal diallage.

Middlefield. In small quantity and small grain in serpentine.

C. Dewey: Geol. Berkshire County; Am. Jour. Sci., 1st series, Vol. VIII, p. 49.

(The first citation was probably a bronzy hornblende; the second, bastite.)

1868. See Enstatite.

1883. **Diallage.** Belchertown, Palmer.

In dark-green diallage granite, mostly changed to tonalite, in South Belchertown, and extending to Palmer.

Diallage with the usual brown-red inclusions as abundant and well characterized as in hypersthene from Pauls Island. Color green, fibrous; crystals just visible to the eye, then deep bronze like hypersthene, changing into a green fibrous uralitic hornblende, and this on the border into a scaly ring of bright-green chlorite.

DIALLOGITE.

See Rhodochrosite.

DIASPORE.

1865. **Diaspore.** Chester.

Needle-shaped crystals and blades on joints of emery blocks or sometimes embedded in compressed rounded masses quite within its substance; colorless, pink, violet; perfect crystals in open spaces.

C. U. Shepard: Report on Chester emery mine, p. 9.

1865. Diaspore. Chester.

With rose-colored amphodelite and with radiated epidote; distinct crystals and broad white laminæ.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XL, pp. 112. 123.

1866. Diaspore. Chester.

Analysis.

	No. 1.	No. 2.
H_2O	14.75	14.8
Al_2O_3	80.75	83.0
$FeO(TiO_2)$	4.50	.....
$Fe_2O_3(TiO_2)$	.....	3.0
	100.00	100.00

C. T. Jackson: Ibid., Vol. XLII, p. 107.

1870. Diaspore. Chester.

Fine crystal, semitransparent and of rich hair-brown color, with a faint tinge of violet; sp. gr. 3.343.

Analysis.

H_2O	15.80
PO_5	0.32
$FeO(MnO)$	0.38
Al_2O_3 (dif.)	83.50
	100.00

C. U. Shepard: Min. Contrib.; Am. Jour. Sci., 2d series, Vol. L, p. 96.

1886. Diaspore. Chester.

Commonly in thin cleavage planes implanted upon a magnetite gangue, occasionally in very delicate acicular crystals and again in groups of crystals tabular, parallel to the brachypinacoid. The crystals are in fact composite, consisting of parts in nearly parallel position. They are deeply striated in the vertical zone and also in the zone *p e*. The observed planes are *a* (100, *i*-*i*), *b* (010, *i*-$\bar{i}$), *h* (210, *i*-$\bar{2}$), L (120, *i*-$\breve{2}$), *e* (011, *i*-$\breve{i}$), *s* (212, 1-2), *p* (111, 1), U (344, 1-$\frac{1}{3}$), V (122, 1-$\breve{2}$).

E. S. Dana: Am. Jour. Sci., 3d series, Vol. XXXII, p. 388.

1890. Diaspore.

The old vein has been reopened and a shaft 150 feet deep sunk from the hilltop to the main adit. Much diaspore struck in thicker veins and very broad sheets. Single cleavage surfaces 4 to 5 inches broad, 9 to 10 inches wide. Great masses of loosely interlaced blades of the finest color and luster, from rich peach-blossom color to deep pink. Also broad surfaces of magnetite covered with tabular crystals of a rich, smoky, amethystine color. The finest specimen, a surface nearly a foot square, is owned by Mr. N. A. Howard, director of the Hampden Quarry Company.

DILLNITE.

1876. Dillnite. Pelham.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 3.

(Probably the clay-like material from the entire decomposition of the biotite at the asbestos mine.)

DOLOMITE.

1818. **Bitter spar.** Loudville. Southampton lead mine.
Fine specimens.
A. Eaton: Southampton adit; Am. Jour. Sci., 1st series, Vol. I, p. 137.

1820. **Dolomite.** Middlefield (E. Emmons).
Professor Dewey: Am. Jour. Sci., 1st series, Vol. II, p. 236.

1822. **Brown spar.** Leverett.
In vein of galena (Hitchcock).
Cleaveland: Min., Vol. I, p. 183.

1823. **Brown spar.** Leverett.
In vein of galena, pyrite, copper, and blende; grouped in rhombic crystals on quartz, the lamellæ usually rounded.
E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 212.

1823. **Rhomb spar. Dolomite.** Southampton, Middlefield.
Ibid.

1824. **Dolomite.** Middlefield.
In steatite; some fine white close-grained; others show cleavage distinctly; others yellowish-brown, high pearly luster, translucent; also in west of town with tremolite.
C. Dewey: Geol. Berkshire County; Am. Jour. Sci., 1st series, Vol. VIII, p. 34.

1824. **Rhomb spar.** Middlefield.
E. Emmons: Loc. Min.; ibid., Vol. VII, p. 255.

1824. **Brown spar.** West Springfield.
With amethyst; found by Mr. Alonzo Chapin.
C. U. Shepard: Min. Loc.; ibid., Vol. VIII, p. 235.

1825. **Rhomb spar.** Southampton.
In veins of galena.
Robinson's Cat., p. 70.

1826. **Rhomb spar.** Cummington.
Well crystallized in steatite.
J. Porter: Min. Loc.; ibid., Vol. X, p. 18.

1835. **Bitter spar.** Middlefield.
Masses 3 to 4 inches across in delicate green talc, white or salmon-colored.
E. Hitchcock: Geol. Mass., p. 362.

1835. **Ankerite.** In West Springfield, in connection with the coal formation.
C. U. Shepard: Min., Part II, Vol. I, p. 25.

1835. **Brown spar.** Leverett; north mine.
Few crystals.
E. Hitchcock: Geol. Mass., p. 502.

1841. **Brown spar.** Leverett.
E. Hitchcock: Geol. Mass., p. 101.

1841. **Bitter spar.** Middlefield.
E. Hitchcock: Geol. Mass., p. 700.

1841. **Miascite.** Zoar.
Columnar variety of dolomite; in talcose schist.
Ibid.

1844. **Breunnerite.** Ibid.

Suggests that the rhombohedral crystals in steatite in Middlefield are of this species.

F. Alger: Alger's Phillips Min., p. 297.

1866. **Dolomite.** Chester.

In some veins with sapphire at Chester emery mine.

C. T. Jackson: Proc. Bost. Soc. Nat. Hist., Vol. XI, p. 32.

1876. **Ankerite.** West Springfield.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 2.

(The coal formation mentioned above (1835) is, of course, the dark Triassic shale, and the citation seems to be the same as that given by Professor Shepard, 1825, of brown spar with amethyst. This would make the locality to be the trap, as no amethyst has been found in the shales. I have found only calcite and siderite in the shale and trap of this region.)

1890. **Dolomite.**

Dolomite in fine cleavage specimens, associated with green talc, can be obtained at all the serpentine beds, especially at Middlefield and Rowe.

All the crystals I have seen from the lead mines have been calcite and not dolomite.

1895. **Dolomite.** Chester.

In running the adits in the talc bordering the emery vein fine, large specimens of dolomite have been obtained. They were large, white rhombohedra.

ENSTATITE.

1826. **Petalite** (?). Westfield, 5 miles west of Academy.

Unknown mineral suspected to be petalite; sp. gr. 23–25; scratches glass; fine foliated; melts to enamel with difficulty; no effervescence; in places rose red or purple; in 1-inch layers in serpentine; no lithia, but lime and magnesia.

E. Davis: Rocks and minerals of Westfield, and appendix; ibid., Vol. X, p. 213.

(This is the enstatite from the Munns Brook locality on the line between Southwick and Granville or from bowlders of the same farther north.)

1835. **Scapolite.** Westfield.

Compact.

C. U. Shepard: Min., Part II, Vol. II, p. 175.

1841. **Scapolite** or **Petalite.** Westfield.

In serpentine in Westfield in vein nearly 1 foot wide.

Ibid., p. 618.

1841. **Anthophyllite.** Westfield.

"Also a mineral which I am disposed to refer to anthophyllite."

E. Hitchcock: Geol. Mass., p. 618.

1868. **Diallage.** Westfield and Blandford in serpentine.

J. D. Dana: Sys. Min., p. 220.

(The Westfield citation is plainly the above; that from Blandford I suppose to be Shepard's "anthophyllite," which I have referred to actinolite.)

1889. **Enstatite.** Granville.

The coarse enstatite rock of Munns Brook, Atwater's quarry, and Westfield River is described in the monograph on the region, and the large crystals of enstatite, superficially altered to bastite and talc, which occur in bowlders at the cemetery in Granville and just north in the great

1889. **Enstatite**—Continued.

ledge in the swamp east of J. Downey's and also south of J. M. Cooley's in the northeast of Granville, where crystals 6 inches long can be obtained. are fully discussed.

1893. **Diallage.** Westfield and Blandford in serpentine.

C. Hinze: Min., p. 1091.

EPIDOTE.

1818. **Epidote.** Deerfield, Shutesbury, Leyden, Pelham (poor).

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 114.

1823. **Epidote.**

Tolland (Webster); Shutesbury, small crystals in gneiss. In many other places not very interesting. Shelburne, arenaceous. East Shutesbury, Leyden, Shelburne, Buckland, Whately, Belchertown, Mouson, in hornblende and greenstone slate.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 223.

1824. **Epidote.** Pelham.

C. U. Shepard: Min. Loc.; ibid., Vol. VIII, p. 235.

1824. **Epidote.** Worthington, upon hornblende rocks; Middlefield, Chester.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 44.

1825. **Epidote.** Belchertown.

In greenstone (Eaton).

Robinson's Cat. Min., p. 36.

1825. **Epidote.** Plainfield, crystallized or granular. Williamsburg, in quartz, remarkably beautiful.

J. Porter: Min. Loc.; Am. Jour. Sci., 1st series, Vol. IX, p. 54.

1827. **Epidote.** Williamsburg.

In quartz in layers, with small garnets as a focus, around which the epidote is radiated.

A. Nash: Lead mines of Hampshire County; ibid., Vol. XII, p. 259.

1835. **Epidote.** Williamsburg, Middlefield, Chester, Cummington, Worthington, Plainfield.

In mica-slate embedded in quartz with hornblende.

E. Hitchcock: Geol. Mass., p. 346; Geol. Mass., 1841, p. 606.

1841. **Epidote.** Pelham, with schorl in gneiss.

E. Hitchcock: Geol. Mass., p. 637.

1844. **Epidote.** (*Carbunculus rhomboideus.*) Rowe.

In hornblende slate.

J. D. Dana: Sys. Min., p. 379.

1865. **Epidote.** Chester emery vein.

Frequent, especially in the vein on both sides the smaller Deerfield River; light yellowish-green; 1 to 2 inches long by one-eighth to one-fifth inch wide, with margarite; also radiated pistachio-green with diaspore on cross joints of vein rock.

C. U. Shepard: Report Chester emery mine, p. 11.

1866. **Epidote.** Northfield; on Northfield Mountain.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 248.

(Only unimportant traces of epidote were found by me during a careful survey of Northfield Mountain, and the best local mineralogists know of no important locality there.)

1882. **Epidote.** Pelham. Ward's quarry, in gneiss.

In elongated, flattened, and striated blades and sheaf-like aggregations of blades, blackish-green at one end and pistachio-green at the other.

1882. **Epidote.** Deerfield.

"Occurs rarely low down in the prehnite; more commonly in drusy surfaces in its upper part, or spread in delicate tufts of flat blades upon the spindle-shaped crystals. It is included also with interrupted crystallization in the calcite which follows upon the prehnite. The maximum size of the crystals is 3 mm. They are mostly thick plates, and under the microscope show as brilliant luster and as rich dark-green as the specimens from the Dauphiny. It incloses as an aggregate prehnite, sphalerite, chalcopyrite, and calcite, but the separate crystals are perfectly pure and transparent. The thickest crystals are deep pistachio-green: the thin plates are deep brown-red, sometimes half colorless."

B. K. Emerson: Deerfield dyke and its minerals; Am. Jour. Sci., 3d series, Vol. XXIV, p. 350.

1883. **Epidote.** Pelham; Gaylord's pasture.

In fragments of large bowlder west of the west serpentine knob, 1 mile south of red house; the bowlder made up wholly of epidote and calcite; quite good crystals an inch long; twins. Most of the epidote crystals in collections from Pelham are from this locality. The beautiful slickensided surfaces of light-green polished epidote come from the gneiss in the west of Pelham.

1885. **Epidote.** Rowe.

Curved, thick, columnar forms in pyrite in J. M. Davis & Co.'s mine.

Analysis.

SiO_2	38.20
Al_2O_3	24.62
Fe_2O_3	12.20
MnO	.57
MgO	.13
CaO	21.59
Alk	.37
H_2O	2.16
Res	35.00
	[1]100.19

A. G. Dana: Gahnite of Rowe; Am. Jour. Sci., 3d series, Vol. XXIX, p. 456.

1892. **Epidote.** Rowe.

In the pyrite mine with gahnite.

E. S. Dana: Min., p. 520.

1885. **Epidote.** Chester, Worthington, Hawley, Warwick, Huntington.

Chester. On a flat fissure surface of the emery an acicular-radiate growth, the blades being 5 cm. long and of a fine light pistachio-green. Also beautiful elongate-bladed crystals of deeper color on granular chlorite. The finest specimens are in the collection of Mr. Ames, of Chicopee.

Worthington. Below Cushing's gate, 1 mile west of Center. Fine crystals occur in the chlorite schist of the Hawley series.

[1] Two analyses.

1885. **Epidote**—Continued.

Hawley. M. V. Cressey's farm. Large bowlders full of large interlaced blades, often much warped of deep-green epidote in sericite-schist of the Hawley series.

Warwick. Crystal hill. On the blind road running south from the village to Hastings pond. Great masses of a rock consisting of massive epidote of rich pistachio-green and deep-red garnet, associated with hornblende schist. Drusy surfaces of very dark epidote crystals of complex form occur.

Huntington. A half mile south of the East Branch. From a calcareous layer in the Conway schist, associated with coarse biotite. Pearl-gray crystals which strongly suggest zoisite. I found the angles of epidote by many measurements. Fine crystals nearly an inch across and two inches long, elongated in the direction of *b* and twinned, with the twinning plane *a* often multiple twinned. From the rarity of the color these crystals have sold for high prices.

EUCHLORITE.

1876. **Euchlorite.**

See Biotite.

EUMANITE.

1851. **Eumanite.** Shepard. Chesterfield.

Only a single minute crystal less than a grain in weight is known. Described and figured.

Editor's note (J. D. Dana?): Remarks the crystallographical similarity with topaz.

Mineralogical notices: Mineral species described by Prof. C. U. Shepard; Proc. Am. Assoc. Adv. Sci., Vol. IV, p. 317; Am. Jour. Sci., 2d series, Vol. XII, p. 211.

1851. **Eumanite.** Chesterfield.

"A few days since I received for examination from Mr. J. E. Teschemacher two minute crystals of the eumanite of Professor Shepard. They had long been in his cabinet.

"Eumanite and brookite are very closely similar, not only in physical characters, but also in crystallization."

J. D. Dana: On the crystallographic identity of eumanite and brookite; Am. Jour. Sci., 2d series, Vol. XII, p. 397.

1852. **Eumanite.** Chesterfield.

J. E. Teschemacher: On the angles of eumanite; Am. Jour. Sci., 2d series, Vol. XIII, p. 117.

1852. **Eumanite.** Chesterfield.

Description and figure. It appears to approach mengite.

C. U. Shepard: Min., 3d ed., p. 285.

1868. **Brookite.** (?) **Eumanite** (Shepard). Chesterfield.

Its chemical identity with brookite has not been ascertained.

Dana: Min., p. 165.

1876. **Brookite. Eumanite.**

Omitted, probably by oversight.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst.

1892. **Eumanite.**

Made to follow brookite as an imperfectly known species.

E. S. Dana: Sys. Min., p. 243.

The crystals upon which the species was founded were burned with the Shepard collection. As the mineral was not found by Julien in his exhaustive study of the tourmaline-bearing veins, the final determination of the mineral will probably be long delayed.

FASCICULITE.

1823. **Fasciculite.** (Hitchcock. See Amphibole.)

This form of hornblende is so widely spread and characteristic in the Hawley schists that I have frequently used the word as a variety name in the geological discussion of the region.

FIBROLITE.

See Sillimanite.

FLUORITE.

1810. **Fluat of lime.** Loudville.

First pointed out as such by Dr. Bruce, who has recently visited the spot. The prevailing color is green, but there are spots of purple and blue; the structure is lamellar; the green pieces are translucent, and a few cubical crystals occur.

B. Silliman: Bruce's Jour., Vol. I, p. 68.

1822. **Fluate of lime.** Deerfield.

Dr. Cooley has discovered in Deerfield fluate of lime, crystallized, I believe, in dodecahedrons, though I could not determine this certainly, as I had no glass when I examined them.

Letter of E. Hitchcock: Am. Jour. Sci., 1st series, Vol. V, p. 407.

1822. **Fluorite.** Near Northampton.

Dr. David Hunt: Editor's note; ibid., Vol. VI, p. 188.

1823. **Fluate of lime.** Conway. Loudville. Deerfield.

Conway. Massive, light green; in small quantities in a vein in mica-slate. Loudville (Gibbs). Deerfield; in a loose stone with galena.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 212.

1841. **Fluor spar.** Conway. Loudville.

Green and purple. Hollow pseudomorphs in quartz cubes, drusy within and without.

E. Hitchcock: Geol. Mass., pp. 701–702.

1858. **Fluor spar.** West Springfield.

Purple, incrusting Triassic bituminous limestone.

E. Hitchcock: Cat. State collection; Rep. State Board Agri., p. xx.

1882. **Fluorite.** Northfield.

Purple; in fissures in quartzite in Ross's lead mine. Winchester line, Perchee Brook.

1882. **Fluorite.** Deerfield.

"Emerald-green dodecahedra, like beads strung upon a satin thread, occur half embedded in and scattered over and among the last-formed fibrous prehnite, the crystals 0.03 mm. in length; also in the same relation to epidote and inclosed in the calcite which succeeds these. In a single case each emerald-green octahedra and cubo-octahedro, 0.03 mm. in size, in a drusy cavity in epidote and in green cubes upon prehnite."

B. K. Emerson: Deerfield dyke and its minerals; Am. Jour. Sci., 3d series, Vol. XXIV, p. 350.

1886. **Fluorite.**

Northampton. Quarry south of W. N. Moore's, east of Florence.

In minute colorless cubes incrusting calcite, and in hollow quartz pseudomorphs after the same.

Hatfield. At lead mine. In small quantity on barite; purple.

Hawley. At the southern openings on the hematite vein; white cubes, 8 mm. across.

GAHNITE.

1885. **Gahnite.** Rowe.

In pyrite, at the mines of J. M. Davis & Co.

In outer portion of pyrite mass; greenish; up to three-fourths of an inch in size; O, ∞ O, twins.

Analysis.

Al_2O_3	54.83
Fe_2O_3	3.00
FeO	3.37
MnO	Trace.
MgO	1.93
ZnO	36.92
SiO_2	.53
	[1]100.58

A. G. Dana: On the gahnite of Rowe; Am. Jour. Sci., 3d series, Vol. XXIX, p. 455.

1888. **Gahnite.**

Analysis.

Al_2O_3 and Fe_2O_3	58.05
ZnO	35.90
Insoluble	1.49
	95.54

Gahnite or zinc spinel from Rowe, Mass., W. O. Crosby and C. L. Brown. Tech. Quarterly, Vol. I, p. 407.

GALENA.

1810. **Galena.** Southampton lead mine.

"Both of the broad foliated kind commonly called potters' lead ore, and of the small foliated kind usually denominated steel-grained ore; masses from a fraction of an inch to more than a foot in diameter; very pure and rich. Sometimes beautifully crystallized in cubes with blende on quartz; affords 50 to 60 per cent of lead, 12⅛ ounces per ton, silver."

B. Silliman: Bruce's Jour., Vol. I, p. 65.

[1] Mean of two analyses.

1818. **Galena.** Whately, Montgomery, Southampton, Hatfield.

Single crystals not in place in Greenfield.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series. Vol. I, p. 115.

1818. **Sulphuret of lead.** Southampton.

The fairest cubic crystals are slightly attached to the points of the quartz crystals. Found 774 feet from the mouth of the adit.

Amos Eaton: Southampton adit; ibid., p. 136.

1827. **Galena.**

Leverett. One mile northwest of meetinghouse, 1½ miles south of the first locality; in granite. Hatfield, 1 or 2 miles west of village, in syenite. Williamsburg, east part; granite, runs into Whately; one-half mile west of above, in granite. Whately, southwest part, in granite; on north line, in granite. Conway, east part, in granite. Williamsburg, northeast part, bowlders of granite. Goshen, 60 rods west of church, in mica slate. Northampton, southwest part. Southampton. Loudville, and 3 or 4 miles south.

A. Nash: Lead mines of Hampshire County; Am. Jour. Sci., 1st series, Vol. XII, p. 249.

1835. **Galena.** In fetid limestone in West Springfield, at Paine's quarry.

E. Hitchcock: Geol. Mass., p. 230.

1838. **Galena.** Russell. Farm of John Gould. Norwich, farm of Quartus Angell.

E. Hitchcock: Econ. Geol., p. 127.

1841. **Galena.** Fourteen veins in vicinity of Connecticut River.

Adds nothing to preceding citations.

E. Hitchcock: Geol. Mass., final report, p. 199.

1844. **Galena.** (*Plumbites cubicus.*) Southampton. Leverett.

J. D. Dana: Sys. Min., p. 497.

1882. **Galenite.** Deerfield.

Extremely rare in minute grains in prehnite, chlorophæite, and calcite; in veins in diabase.

B. K. Emerson: The Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 351.

1883. **Galena.** Leverett.

East mine, in fine small cubes.

Whitaker, class of '83, Amherst College.

1895. **Galena.** Southampton lead mine.

Pseudomorph in quartz. Hollow cubes, with thin plates on the interior, which have penetrated the cubical cleavage of the galena.

GARNET.

1818. **Garnet.** Conway, Deerfield, Shelburne.

Melanite. Conway.

E. Hitchcock: Geology of Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 114.

In a supplement it is said that above is probably not melanite; ibid., p. 439.

1822. **Garnet.** Plainfield.

Mass as large as one's head entirely composed of garnets one-fourth inch diameter in hyaline quartz.

Dr. J. Porter: Editor's note: Am. Jour. Sci., 1st series, Vol. IV, p. 55.

1823. **Garnet.** Tolland, Plainfield, Chesterfield, Conway, Deerfield, Brimfield.

Tolland; nearly rose red (Webster). Plainfield, in limpid quartz, trapezohedrons black (J. Porter); in talcomicaceous slate, dodecahedrons brown-red, one-third inch in diameter, dodecahedrons with truncated edges, dull-red, two-fifths inch; also in dodecahedrons 2 inches in diameter in talcose slate. Chesterfield, with sappare, trapezohedrons, light rose-red. Conway and Deerfield, in hornblende and mica-slate, black dodecahedrons.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 222.

1823. **Pyrope.** Brimfield.

In granite, with light-green feldspar in rounded irregular masses of a delicate poppy red, much resembling some varieties of the ruby. "It scratches crystallized quartz," says Professor Dewey, "and melts rather hardly into a dark enamel; found in digging a well."

E. Hitchcock: Loc. cit.

1823. **Colophonite.** At Conway?

E. Hitchcock: Loc. cit., p. 222.

1824. **Garnet.** Hawley, Middlefield, Chester.

Hawley; large dodecahedrons. Middlefield; dodecahedrons, trapezohedrons, and the same with truncated edges.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 44.

1824. **Melanite.** Chester; in hornblende.

C. Dewey: Ibid.

1825. **Melanite.** Conway; in mica-slate.

Eaton: Index, p. 145; Robinson's Cat., p. 44.

1826. **Garnet.** Chesterfield.

Some rocks of reddish-brown hornblende contain an immense number of garnets from the size of a shot up to that of a small cannon ball. These rocks are situated a mile northeast of the meetinghouse, near the celebrated locality of cyanite.

J. Porter: Min. Not.; Am. Jour. Sci., Vol. IX, p. 18.

(This is the garnet-cummingtonite rock.)

1835. **Garnets.** Brimfield, Wales, Ware.

Very delicate garnets in Brimfield, in gneiss; also less fine in Wales and Ware.

E. Hitchcock: Geol. Mass., p. 398.

1841. **Garnet.** Westfield.

Massive in serpentine. Also summary of above citations.

E. Hitchcock: Geol. Mass., pp. 188, 606, 618.

1844. **Garnet.** (*Carbunculus dodecahedrus.*) Brimfield, Chesterfield, Cummington.

J. D. Dana: Sys. Min., p. 382.

1866. **Garnet.** Northfield, on Northfield Mountain.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 248.

1886. **Garnet.** Northfield.

Fine deep-red garnets, almost suitable for cutting, occur in immense numbers on old Chapin farm on Northfield Mountain, five minutes' walk east of black lead mine; crystals nearly an inch across, 2 O 2 with striated faces, ∞ O.

1887. Garnet. Davis mine, Rowe.

Red-brown, 6 to 8 mm. across, ∝ O. Broad surface of pyrite and garnet, making attractive specimens.

1894. Garnet. Almandite. Goshen, etc.

The garnet characteristic of the Goshen and Conway schists, which has often been called melanite, is a common iron alumina garnet.

The crystals have a curious and beautiful structure when seen in thin section. Commencing at the center, six radial bands of quartz grains extend outward in the clear material, and the latter becomes gradually clouded with a very fine dust, which increases to a maximum, and a clear band follows with beautiful bastion-like outgrowths at the corners. (See fig. 1, showing garnet with quartz enclosures and clear rim from secondary enlargement, from Conway schist, Hawk's quarry, Goshen.)

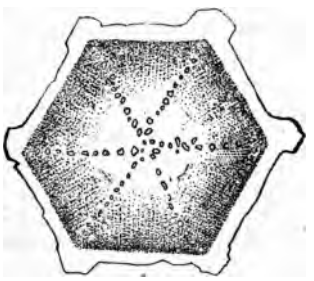

Fig. 1.—Garnet with quartz inclosures.

An analysis was made by Mr. George Steiger, of the United States Geological Survey, of material selected from a typical specimen of the Conway schist coarsely spangled with transverse biotites from the northwestern part of Goshen.

Analysis.

SiO_2	37.30
TiO_2	.24
Al_2O_3	21.84
Fe_2O_3	.98
FeO	32.62
MnO	1.86
CaO	3.19
MgO	2.50
	100.53

1894. Garnet. Warwick.

On south road to Warwick, at last house but one before reaching town line; crystals quite good and abundant in mica-schist, ∞ O, 2 O 2, 9 mm. in diameter. Also on North Mountain, three-fourths mile east of Horace Sykes's; crystals deep-red and of perfect form, ∝ O, 2 O 2, 25 mm. in diameter.

Warwick, at D. Bacon's, northwest of town, ∞ O up to 10 mm.; fine crystals in mica-schist.

1894. Garnet.

Chester, at the "quartz mine" in the extreme east of the town, 2 O 2; 30 mm. in diameter, fine dark-red near center; large and fine, like the Russell crystals.

1894. **Garnet.** Russell.

One mile south of Thorp's, now Pomeroy's, the first house on the river road coming from Westfield, perfect forms 2 O 2, abundant and very large black almandine garnets from a granite vein. This locality has been largely worked by Mr. Daniel Clark and by a Mr. Johnson, of Tyringham, and specimens from this locality, most ingeniously fabricated, have been offered for sale as coming from Tyringham. Many hundred dollars' worth were obtained from the locality, which is now exhausted. They have been also cited as coming from Westfield.

1894. **Garnet.**

Huntington, 2 O 2 in granite, 75 mm. across.

1895. **Garnet.** Northfield.

C. A. Ware's pasture, Gulf road; bowlder of coarse muscovite granite.

Red almandine garnets with exceptional dodecahedral cleavage, of the form 2 O 2, three-fourths inch across, with a kelyphite-like rim three-sixteenths inch wide, but with irregular outer border, which is opaque white, but appears finely plumose with a lens. A narrow dark-green border can be seen to separate the white rim from the garnet.

Under the microscope the garnet is seen to have a very irregular surface, and a layer of zoisite and hematite fits into all the irregularities and builds out quite perfect crystal faces for the garnet. The hematite is in parallel bands in distant partings in the zoisite, and round blebs of this are inclosed with quartz grains in the clear garnet.

Outside this is a second thin layer of a green chlorite, and the series is closed by a broad and beautifully plumose and tufted growth of fibrolite in the finest fibers, which grows out into the feldspar and quartz of the surrounding granite.

GEDRITE.

1892. **Gedrite.** (Aluminous anthophyllite.) Warwick.

On the hill 20 rods south of Harris's soapstone quarry. A very coarse, granular, rich hair-brown rock. The separate plates show fine cleavage parallel to the prism and pinacoids. Under the microscope a part of the color is found to be due to the deep red-brown rutile grains and rods, which often are geniculate crystals.

The mineral shows moderate pleochroism; *a* almost colorless; *b* clove brown; *c* pale clove brown. Transverse sections, showing strong cleavage of 124°, gave the ring system symmetrical to *c* and the plane of the optical axes parallel to *b*. It is optically negative.

Delicate needles, long and rigidly straight and parallel, occur now and then in some number parallel to *c* and *b*. The mineral is very fresh, and will furnish fine cabinet specimens in great quantity. The large soapstone deposit to the north is formed by its decomposition.

The following analysis (I) was made with very fresh material, separated by heavy solution, in the laboratory of the Survey, by Mr. E. A. Schneider. II was of the average rock, by L. G. Eakins.

	I.	II.		I.	II.
SiO_2	47.86	50.65	K_2O	.06	.04
TiO_2*	.63	.50	Na_2O	.93	1.37
Al_2O_3	14.09	13.03	H_2O (105°)	None.	
Cr_2O_3		Trace.	H_2O (above 105°)	2.46	†2.96
Fe_2O_3	.33	.27	P_2O_5	.05	Trace.
FeO	13.41	12.67	B_2O_3		
MnO	.14	.15		100.42	100.33
MgO	19.89	16.96			
CaO	.57	1.73			

* Total 7; O_2 in the form of rutile. † Direct determination.

GOETHITE.

1852. Goethite. Greenfield, near Turners Falls.

In powdery scales along with the chalcopyrite in a thin vein at the junction of the sandstone and trap.

C. U. Shepard: Min., p. 278.

GOLD.

1833. Gold.

E. Hitchcock: Geol. Mass.; Am. Jour. Sci., 1st series, Vol. XXII, p. 65; Separate publication, Amherst, Mass., p. 65.

The probability of finding gold in the sericite-schist is fully discussed and an account is given of its being found in his presence at Somerset, Vt., just over the State line; twenty or thirty pieces, in weight 7 grains. He indicates the neighborhood of the Hawley iron mine or the Plainfield manganese bed or the bed of the Deerfield River, in Monroe, or Charlemont, as probable localities.

1841. Gold.

I have received many reports of the washing of gold in the western hills, but have never seen any derived from any portion of the three river counties, nor does President Hitchcock seem to have been more fortunate. He gives a long list of foolish attempts to find the precious metal.

Geol. Mass., 1841, p. 612.

1879. Gold. Chester.

"Specimens of gold and silver are said to have been found" in Chester.

Hist. Conn. Valley, Vol. II, p. 1054.

1886. Gold. West Worthington.

[From the Hampshire Gazette, February 22, 1886.]

WEST WORTHINGTON, *January 25, 1886.*

To the Editor of the Hampshire Gazette:

Prof. Edward Hitchcock, a former president of Amherst, was an eminent geologist, as is very well known from his different works on the science, and he was many years ago employed to make a geological survey and report of the State of Massachusetts. He found the lone, long, narrow streak of talcose slate formation, but did not stop, it seems, to look it over carefully to see what it contained. He left that for others to do.

I will premise "that these talcose rocks are to a great extent the gold rocks of the world, especially the quartz veins therein." So states Professor Dana in his Mineralogy. The comparatively narrow strip of talcose slate ledge starts at the south end including Chester, extends north to Vermont State line in the town of Heath, where they are now mining for gold and copper. In my present brief description of this strip of talcose ledge, I shall confine myself to the two ends of a section about 3 miles in length, running in a north and south direction, in the towns of Worthington and Peru.

First, at the south end, on the farm of Austin Geer, of West Worthington, are two large quartz veins, one white and the other yellow in color. They run parallel with each other, about 20 rods apart. They crop out of the slate rock, 6 rods in length each, and will average about 2 feet in width. These two veins are thickly filled from the surface down with very beautiful, shining crystallized sulphurets of various-sized cubes of gold, silver, and manganese, or alabandine. Native gold, or a nugget as large as a common-sized pea, has also been found here.

1886. **Gold**—Continued.

Second, at the north end of this limited strip of slate ledge, on the farm of Wesley Pierce, of Peru, occurs a very remarkable open surface bed of rich gold and silver, that has yielded, from fair crucible tests, over $100 to the ton of ore, of both gold and silver.

CHAUNCEY STEPHENSON.

The above letter is copied as an illustration of the basis upon which mining work is still often done in Massachusetts. It is not probable that the writer obtained anything from the region excepting pyrite.

1887. **Gold.** Buckland.

"Gold mine" at house of H. W. Dodge. A thin pyritous hornblende bed in the Conway schist.

I copy the following remarkable papers as another illustration of the manner in which people are still led to waste money on the foolish search for gold:

[W. French Smith, Ph. D. (consultation), State assayer and analyst for Massachusetts; A. B. Brown, assayer and analyst. Certificate of analysis, 7509.]

In 2,000 pounds.

0.25 ounce Troy gold, at $20.67	$5.17
1.14 ounces Troy silver, at $1	1.14
0.00 ounce Troy copper, at 11 cents	0.00
5 ounces Troy lead, at 5 cents	.25
	6.56

January 6, 1887. 235 Washington street, Boston.

[Established 1853. Gold and Silver Refining and Smelting Works of L. B. Darling. Providence, R. I.]

THEODORE WOOD, Esq.,
Shelburne Falls, Mass.

DEAR SIR: The specimens of rock sent me by express give good indications outwardly of containing gold and silver. I have assayed many speciments [sic!] giving less indications and yet good results in the precious metals. The costs of assaying and giving you the real results in value per ton will be $3.

Yours, truly, L. B. DARLING.

MARCH 2, 1887.

[Assay 4218. Drab slaty mineral with iron pyrites.]

Gold per ton, 1 ounce; silver per ton, 2¼ ounces; value, **$23.90.**

[Assay 4564. Dark-blue slate rock with pyrites of iron.]

Gold per 2,000 pounds, four-tenths ounce; silver per 2,000 pounds, one-fifth ounce; value, $8.44.

L. B. DARLING.

A button of the gold obtained from this mine was said to be on exhibition at Mr. Henry Swan's, in Shelburne. It would be hard to find a ledge in the region which showed any less "indications" of gold.

GRAPHITE.

1820. **Plumbago.** Brimfield.

In granite and gneiss.

A. Eaton: Index, p. 94.

1823. **Plumbago.** Cummington, Worthington, Chester.
Foliated.
J. Porter: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VI, p. 248.

1826. **Graphite.** Same.
Ibid., Vol. X, p. 18.

1835. **Graphite.** Same.
E. Hitchcock: Geol. Mass., p. 347.

1838. **Molybdenite.** Brimfield.
In granite with salite.
J. W. Foster; Am. Jour. Sci., 1st series, Vol. XXIII, p. 399.

1841. **Graphite.** Same.
E. Hitchcock: Geol. Mass., final report, p. 607.

1866. **Graphite.** Northfield.
"Black-lead mine" on land of Mr. Piper. A highly plumbaginous mica-schist.
C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 248.
(This occurs one-half mile south of Mr. F. W. Piper's house on the gulf road in Conway schist. Broad pieces 10 mm. thick of very pure graphite can be obtained, showing the finest slickensides or striation caused by the slipping of the mass under pressure. The coarse rich red-brown biotite, which is interfoliated with the graphite, is also much influenced by undergoing pressure on a yielding substratum. It is at times full of secondary cleavages or gliding planes, and at times drawn out into a straight fibrous form of great beauty. A broad plate has been sheared across by many planes at right angles to the base and then each of these rods has been crumpled into a coarse fiber.)

1876. **Graphite.** Leverett lead mine, south mine.
In a mass 1 by 1½ inches, finely slickensided, entangled with barite and quartz on side of 2-inch barite vein.

1885. **Graphite.**
Graphite occurs as coloring matter in the Conway and Goshen schists, across the State on the west side of the river, and in Northfield on the east side, and in shining scales in the garnet hornblende rock at "Pike's Peak," Prospect street, Amherst, and in the Brimfield schist along the eastern border of the three counties, and all the citations above refer to the unimportant occurrences of this character, except that from Brimfield, where the Brimfield graphitic fibrolite schist becomes locally a quite pure graphite schist, which was extensively mined for many years just east of Brimfield, in Sturbridge.

1886. **Graphite.** Charlemont.
Excavation has been made on a quite large bed of impure graphite, about 5 feet wide, about 40 rods northeast of the house of Joseph Tinkham, in the Hawley schist.

1895. **Graphite.** South Hadley.
At Larrabee's quarry quite large scales of graphite occur in considerable abundance upon the surface of the layers of sandstone. They must have been carried across the bottom of the Triassic bay from near Wilbraham and have been derived by the streams from the region about Brimfield.

GYPSUM.

1823. **Gypsum.** Deerfield.

In amygdaloidal greenstone in Deerfield in small quantities; white and retaining its water of crystallization. Found by Dr. Cooley and determined by Professor Silliman.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 212.

1826. **Sulphate of lime** (Gypsum).

In layers in slate in West Springfield, like fish-scales, one-half inch in diameter.

E. Davis: Rocks and minerals of Westfield; ibid., Vol. X, p. 215.

1835. **Gypsum.** West Springfield and South Hadley.

Minute quantity.

E. Hitchcock: Geol. Mass., p. 209.

1859. **"Moulds of organisms."** South Hadley Falls.

E. Hitchcock: Cat. of State collection; Rep. of Board of Agriculture, p. xxi, No. 154.

On examining the specimen in the Survey collection I find there are very flat prismatic cavities often nearly an inch across and resembling exactly the shapes very commonly taken by gypsum crystallizing in clay. They occur in a red argillaceous shale. I have found the same forms at the railroad cut near the dam in Holyoke.

1882. **Selenite.** Deerfield.

Professor Hitchcock mentions that selenite had been found in the Deerfield trap by Professor Silliman (Am. Jour. Sci., 1st series, Vol. V, p. 212), and described molds of unknown crystals left in the quartz of the zeolitic veins east of Deerfield. Casts taken from these molds show that the mineral which has disappeared was selenite, which occurred here very abundantly and in well-formed crystals 20 mm. long. The quartz rises into the molds in sharp parallel crests where it had penetrated between the laminæ of the selenite along the perfect cleavage.

In the Cheapside veins similar but smaller negative crystals occur in the prehnite which at times rose around and covered the selenite before its disappearance, forming thus rude pseudomorphs; and I suspect that part or all of the abundant gashing of the prehnite, quartz, and datolite may be due to this mineral.

B. K. Emerson: Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 351.

1891. **Gypsum.** Delaney's quarry, Northampton, near Holyoke north line.

Surfaces of the trap are covered with pyrite. Above this is a thick layer of calcite slashed by deep cavities 27 mm. long by 3 mm. wide, which are the casts of crystals that have disappeared. The bottom of the cavity is ribbed, as is often the case with gypsum crystals, and such have probably occupied the cavities.

The finding of anhydrite in the trap at Delaney's quarry strengthens the probability of the above interpretation of the negative crystals of the trap.

HALOTRICHITE.

1876. **Halotrichite.** Bernardston.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 2.

(I know nothing of this mineral. Any specimens which may have existed were probably destroyed in the burning of the Shepard cabinet.)

HAMPSHIRITE.

1822. "Crystallized steatite." Middlefield.

"This rare mineral was found by Dr. E. Emmons. * * * The crystals usually occur in groups on masses of steatite. On a piece 3 inches long and 2 inches broad are more than 40 crystals. Some are three-eighths of an inch in diameter and more than half an inch in length. I have one which is double the dimensions just mentioned.

"The surface of the crystals is of a brown color, produced by the action of the weather; but when the crystals are separated their faces are of a yellowish-white color; when fractured, the crystals present an uneven surface, with a structure inclined to the fibrous. The same fibrous appearance is seen on some parts of the steatite—which is destitute of crystals.

"The crystalline structure is exceedingly indistinct, except near the surface. The predominant form of the crystal is a six-sided prism, terminated at one or both extremities by a pyramid of the same number of sides. The truncations are numerous; sometimes on the edges of the prisms or pyramids, and at others on the angles or at the vertex of the pyramid. * * * They very much resemble some quartz crystals."

Then follows an argument against their being pseudomorphs, which is directed against their being pseudomorphs by replacement, and the author concludes that they are crystallized steatite.

Prof. C. Dewey: Am. Jour. Sci., 1st series, Vol. IV, p. 274.

1822. Crystallized steatite. Middlefield.

"I have lately visited the locality of this mineral. It is found in the great bed of serpentine in Middlefield; * * * only in one place between two layers of serpentine; * * * in steatite, 2 or 3 inches thick, the upper surface of which is covered with these crystals. The crystals are, however, separated from the superincumbent mass of serpentine by a thin layer of asbestos (chrysotile) pressed down entirely close upon the crystals, and if it be carefully removed from them shows the form of the heads of the crystals.

Prof. C. Dewey: Ibid., Vol. V, p. 249.

1823. Crystallized steatite.

Analysis.

H_2O	15.00
SiO_2	50.60
Fe_2O_3	2.59
MgO	28.83
MnO_2	1.10
Al_2O_3	.15
Loss	1.73
	100.00

Sp. gr. 2.

C. Dewey: Am. Jour. Sci., 1st series, Vol. VI, p. 333.

1825. Crystallized steatite.

Above cited.

C. Dewey: Geol. of part of Mass., ibid., Vol. VIII, p. 51.

1835. Steatite after quartz.

President Hitchcock cites the discoverer, Dr. Emmons, as believing that these crystals are those of steatite, but, without expressing a definite opinion, seems to believe that they are after quartz, with which, he says, they correspond exactly.

E. Hitchcock: Geol. Mass., 1835, p. 377.

1843. **Steatite after quartz.** Middlefield.

Blum cites the above from Hitchcock, and does not hesitate to class the occurrence as a pseudomorph of steatite after quartz.

Pseudomorphosen, p. 124.

1852. **Saponite.** Middlefield.

Hampshirite (Hermann) quoted as a synonym.

In serpentine and as pseudomorphs copying crystals of quartz. (I can not learn where the name was published by Hermann.)

C. U. Shepard: Treatise on Min., p. 151.

1868. **Aphrodite** (subspecies); Hampshirite. No locality.

Its purity and individuality as a species doubted.

J. D. Dana: Sys. Min., p. 457.

1887. **Hampshirite.** Chester. (See Pl. I, fig. 4.)

There is in the Clark collection, now in Smith College, a unique and remarkable specimen, with this curious label: "Hampshirite; steatitic pseudomorphs after quartz; Chester, Mass., on the road to Middlefield. Locality exhausted and filled up with rocks to prevent anything more being taken from it. Bailey thinks this specimen could not be duplicated. From Rowe's collection. He procured it at the locality for $10.00."

This label is in Mr. James Clark's handwriting. The piece is so interesting that I have figured it in Plate I, D.

It proves to be a pseudomorph after olivine, and to follow quite closely the type figured by Des Cloizeaux. Man. Min. Atlas, Vol. VII, p. 41, from Torre del Greco, showing the faces ∞ P (110), 2 P ∞ (021), 4 P ∞ (041), ∞ P ∞ (010), P (111). ∞ P measured 129° 30′ to 131° 30′; true angle, 130° 2′. 2 P ∞ = 79° to 81° 30′; true angle, 80° 53′. The crystals are in stout prisms up to 4 cm. long; brownish-yellow, and covered in large part by a secondary deposit of a compact fibrous greenish-white chrysotile, sp. gr. 2.24.

The discrepancy in the localities of the "crystallized serpentine" above and the "hampshirite" arise from the fact that the great serpentine mass extends into both towns. They both refer to the same locality. There were fine specimens in the Shepard collection. With the exception of these crystals, I have never been able to detect any trace of olivine by a careful microscopical study of every serpentine outcrop on the west side of the river. Mr. M. E. Wadsworth cites a peridotite from the Westfield River, but says the olivine structure is wholly gone, and his figure shows only the square-meshed enstatite structure. (Lithological Studies, Pl. 7, p. 2.) As indicated above, the locality is now lost.

1892. **Hampshirite.** No locality.

The data given in 1868 are cited without essential change. "Probably not homogeneous."

E. S. Dana: Sys. Min., p. 675.

HEMATITE.

1818. **Specular oxide of iron.** Hawley, Bernardston, Warwick.

Veins wrought to some extent.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 115.

1819. **Specular oxide of iron.** Montague.

"In a detached eminence 100 feet high on land of Mr. Taft, near mouth of Millers River. The whole hill traversed by numerous veins, and scarcely a foot of the rock is to be found which does not contain them, varying in width from a mere line to several inches. The principal vein appears on

1819. Specular oxide of iron—Continued.

the top of the hill, and is, as nearly as I could determine, not less than 10 feet wide, lying in a north and south direction. Ore abundant and generally pure. Masses that have been separated by blasting and weighing 100 to 200 pounds lie on the surface; pyrite present; the gangue is quartz. The walls and hill are composed of granite."

E. Hitchcock: Sup. Geol. Deerfield; ibid., p. 438.

1822. Micaceous oxide of iron. Hawley.

"Of extreme beauty; is found a few miles from Northampton. It has high luster and is contorted with delicate flexing, as if it had lain between the layers of mica-slate, which we presume must have been the fact. Dr. Hunt and Mr. W. C. Dwight, of Northampton, have favored us with specimens, and similar ones from Hawley, in Massachusetts, have been transmitted by Dr. Jacob Porter, of Plainfield; this last is particularly beautiful and is sprinkled with points of magnetic iron."

Editor's note: Am. Jour. Sci., 1st series, Vol. IV, p. 53. (Both parts of this note refer to the same locality.)

1823. Specular oxide of iron. Same.

Ibid., Vol. VI, p. 207.

1823. Micaceous oxide of iron. Bernardston.

With magnetite, like Hawley, in "talco-argillite."

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 208.

1823. Micaceous oxide of iron. Hawley.

Northwest part of town in talcose slate; the principal bed of the ore varies from 6 inches to 3 or 4 feet thick. Mine opened 20 or 30 rods long, 30 or 40 feet deep. Magnetic oxide most abundant; the micaceous oxide not wrought, from the belief that it would not smelt.

Ibid.

1825. Hematite? Vitreous black oxide of iron.

Southampton lead mine, in carbonate of lead. Before blowpipe infusible, becomes magnetic.

C. U. Shepard: Min. Loc.; Am. Jour. Sci., 1st series, Vol. IX, p. 47.

1825. Micaceous iron. Northampton (misquotation of 1822 above for Hawley).

High luster, contorted (Cleaveland.) Warwick; wrought to small extent (Am. Jour. Sci., 1st series, Vol. I, p. 115).

Robinson's Cat., p. 64.

1827. Hematite. Hawley, at junction of mica and talcose slate.

A. Nash: Lead mines of Hampshire County; Am. Jour. Sci., 1st series, Vol. XII, p. 245.

1841. Micaceous specular iron ore. Hawley.

Formerly rejected as worthless, but is an exceedingly rich ore.

Analysis.

Fe_2O_3	99.26
H_2O	.60
Loss	.14
	100.00

Also Montague.

E. Hitchcock: Geol. Mass., p. 196.

1879. **Hematite.** Hawley.

West of the Center is a hill containing a rich deposit of iron ore which was mined about 1800 to supply a furnace near by, and which gave the name of "Forge Hill" to this locality.

Hist. Conn. Valley, Vol. II, p. 704.

1885. **Hematite.**

In minute spheres with concentric structure superficially embedded in quartz crystals, so as always to fill the same half of the surface of each crystal, as if the solution had dripped down a vertical fissure, which was covered with the growing quartz crystals. In diabase south of Titan's Piazza.

Discovered by Prof. J. M. Clarke.

1886. **Hematite.** Hawley.

The fine micaceous ore is a bed intercalated in the schists adjacent to a fault, and the mineral may be regarded as a pseudomorph by replacement of muscovite. It is for the most part a quartz-hematite schist or itabiryte, of which the texture is exactly like that of the adjoining mica-schists, with which it is conformable, only that the mica is replaced by the scales of specular iron. It is interesting to note that a similar replacement of biotite by specular iron occurs among the minerals formed by the partial melting of the olivine-rock inclosures in basalt.[1]

In the case before us I think it probable that heated waters occupying the fissure, and borrowing iron from the adjoining ankerite, have replaced the mica along the sides of the opening.

1891. **Hematite.** South of Northampton.

Quarry in sandstone beside Connecticut River Railroad, at north line of Holyoke.

Fine broad layers 3 mm. thick with botryoidal and drusy surface made of shining plates set edgewise in fissure in brown stone. These plates are formed by the large development of the plane 0. It also impregnates the sandstone. In both cases it is just above diabase, which gives every indication of having been so quickly covered that the heat of the mass greatly quickened the circulation and increased the chemical activity of the solutions which permeated the covering of sand, cementing it and filling its fissures with the hematite.

HERMANNITE.

See Rhodonite.

HEULANDITE.

1825. **Heulandite.** Chester.

"In the cabinet of Dr. Emmons in Chester I was shown specimens of a mineral considered as stilbite, which I at once recognized to be heulandite crystals about one-eighth inch long. Locality exhausted."

C. U. Shepard: Bost. Jour. Phil., Vol. III, p. 608.

1825. **Heulandite.** Chester.

Right oblique prism, acute edges replaced; white; with chabasie and stilbite in mica slate.

E. Emmons: Min. Not., Am. Jour. Sci., 1st series, Vol. X, p. 11.

[1] K. Bleibtreu: Zur Kenntniss der Einschlusse in den Basalten; Zeitschrift der deutschen geol. Gesellschaft, Vol. XXXV, p. 546.

1831. Lincolnite. (Hitchcock.) Deerfield.

Full description, figure, and measurements; named after the then governor, Lincoln. From trap of Deerfield Mountain, east of village.

E. Hitchcock: Geol. Mass., p. 437.

1841. Lincolnite. In trap, 1 mile east of Deerfield.

Description, figures, and measurements.

Ibid., p. 662.

1843. Heulandite.

Declaring the lincolnite to be heulandite and M > T to be 130°.

F. Alger: Proc. Bost. Soc. Nat. Hist., Vol. I, p. 145 (abstract); Bost. Jour. Nat. Hist., Vol. IV, p. 245; also Am. Jour. Sci., 1st series, Vol. XLVI, p. 233.

1844. Heulandite. (*Zeolus rhomboideus.*) Deerfield. Chester.

J. D. Dana: Sys. Min., p. 324.

1844. Lincolnite.

Wishes an arrest of judgment concerning the identity of lincolnite and heulandite, and states that the crystals sent to Mr. Alger were from a second and later find, a few rods from the first; gives a later measurement of Professor Shepard as 116° 45′ to 117° 15′.

[Editor's note: The angle measured is not the primary lateral angle 130° 30′, but the angle of T (0) on $\check{e}$ (2–i) = 115° 10′.]

E. Hitchcock: Am. Jour. Sci., 1st series, Vol. XLVII, p. 416.

1844. Heulandite.

Lincolnite is heulandite.

F. Alger: Alger's Phillips Min., p. 37.

1845. Lincolnite.

Professor Shepard defends the species and gives a new series of measurements, obtaining 117° 08′ 06″; to which B. Silliman, jr., in a note, rejoins that if the new measurements given by Professor Shepard in the above note be correct the corresponding angle of H would be 116° 17′.

Am. Jour. Sci., 1st series, Vol. XLVIII, pp. 175, 179.

1845. Lincolnite.

Thinks that the modifying plane suggested in the note of the editor appended to last paper does not settle the question, "for the modifying plane mentioned occurs rarely, as it is extremely narrow, and it could not be confounded with the primary plane by so practiced an observer as Professor Shepard."

Mr. Teschemacher informs him that he did not know he was measuring the lincolnite, and so gave it no special care, and does not wish to be quoted as asserting the identity.

[Editor's note: The plane $\check{e}$ enlarged may obliterate M, one of the primary faces, or nearly obliterate it, and then the narrow plane left would be the one alluded to above.]

E. Hitchcock: Am. Jour. Sci., 1st series, Vol. XLVIII, p. 64.

1846. Lincolnite.

Peculiarities in the modifying planes have given rise to a secondary form rarely observed in heulandite. These consist in the enlargement of the planes *f* (Phillips) or $\check{e}$ (Dana), so as nearly to obliterate the planes M, being in fact the reverse that we observe in heulandite from other localities.

In the measurements by Professor Hitchcock and Professor Shepard the angle of *f* on T was mistaken for M on T, and in the figure given by Professor Hitchcock it is evident that the plane lettered M should be *f*.

1846. **Lincolnite**—Continued.

The true value of *f* on T is 115° 10′ (Dana). Professor Shepard's last measurement made is 116° 17′.

F. Alger: Loc. of rare min.; Bost. Jour. Nat. Hist.. Vol. V, p. 306.; Proc. Bost. Soc. Nat. Hist., Vol. II, p. 89 (abstract).

1852. **Heulandite**. "Lincolnite (heulandite) belongs here."

C. U. Shepard: Min., 3d ed., p. 163.

1876. **Lincolnine**. Deerfield.

C. U. Shepard: Cat. Min. 75 miles of Amherst College, p. 4.

Given in accordance with his suggestion to use "ine" for minerals whose specific character is not fully settled, a suggestion which has not been anywhere adopted.

1880. **Heulandite**. Amherst.

At Pikes Peak, a small projecting rock at the north end of Prospect street, now blasted away for the foundation of a house, in a quartz-garnet-hornblende rock, beautiful brick-red crystals (P, M, T, N, *z*) 3 mm. long, tabular on M, and in drusy crystalline surfaces, on fissures with very fresh pyrite, plainly of very recent development.

1882. **Heulandite**. Deerfield.

This mineral occurs quite abundantly at the new cutting in small, stout prisms, *i*-*i*, 2-*i*,-2*i*, up to 2 mm. in length, with sharp edges and no indication of other faces. It is the lincolnite of President Hitchcock, and the specimens studied by me agree exactly with those labeled lincolnite by him, and coming from the old locality east of Deerfield. The mineral collection at Amherst contained a few crystals also identical with the above, from the Fitchburg railroad cutting, and these were separated by Professor Shepard from heulandite under the name lincolnite.

After careful study I find all these crystals identical with each other and with heulandite, both optically and crystallographically.

B. K. Emerson: The Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 357.

HORNBLENDE.

See Amphibole.

HUMOFERRITE.

1876. **Humoferrite**. (Shepard. See Limonite, 1876.)

An unused synonym.

ILMENITE.

See Menaccanite, 1846.

INDIANITE.

See Oligoclase, 1865.

ISERINE.

See Menaccanite, 1835.

JEFFERISITE.

1870. **Vermiculite** or **Jefferisite**. Pelham.

Irregular veins separated by a decomposed asbestos, an altered mica; H. = 1.5; luster pearly, sometimes metallic; exfoliates, fuses on edges; shows six-rayed asterism.

J. H. Adams, class of '70, Amherst College; Am. Jour. Sci., 2d series, Vol. XLIX, p. 271.

1870. Vermiculite?. Pelham.

Loses 7 per cent by ignition; 50 per cent dissolved in aqua regia, leaving white scales resembling margaric acid. They are so remarkable for their uniformity of size, freedom from color, and pearly luster as scarcely to suggest their inorganic composition. Under the microscope, however, they give very nearly the distinct lateral cleavage line of mica. Nor have they the perfect elasticity of a true mica. They show no tendency to further exfoliation when heated. Before the blowpipe they melt with difficulty on the edges into a colorless glass. Professor Des Cloizeaux was kind enough to examine some of these scales optically and found them to be uniaxial; the exfoliation caused by the coating of the mica scales with a hydrated argillaceous mixture, which probably owes its origin to the decomposition of some other member of the micaceous or chloritic family.

Al_2O_3	14.00
MgO	13.68
Fe_2O_3	32.00
Si_2O_3	24.00
Alk(?)	(?)

C. U. Shepard: Min. Contrib.; ibid., Vol. L, p. 96.

(Prof. L. Mears found the margaric acid-like scales obtained by boiling the above vermiculite in aqua regia to dissolve in K_2O, hence they are SiO_2.)

1875. Pelhamite. Pelham.

Full description and analysis.

J. P. Cooke, jr.: On the new varieties of vermiculites; Proc. Am. Acad. Arts Sci., Vol. X, p. 453, Boston.

1891. Jefferisite. Pelham.

New excavations have produced crystals 4 inches square and nearly an inch thick, exactly like those from Westchester, Pa. They are a rich bronze-brown, often bent. They are derived from the biotite which surrounds the olivine rock.

KAOLINITE.

1823. Porcelain clay. Plainfield (Silliman), Conway, and Leyden, in small quantities.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 229.

1827. Kaolin. Williamsburg; of superior quality. Conway.

A. Nash: Lead mines of Hampshire County; ibid., Vol. XII, p. 261.

(The first may be the infusorial marl recently patented by a man in Williamsburg as a filling for piano frames.)

1831. Porcelain clay. Norwich, at lead mine.

Analysis.

H_2O	8.00
SiO_2	53.40
Al_2O_3	36.26
CaO	.24
MgO	.68
MnO	.20
	98.88

E. Hitchcock: Economic Geol., p. 130.

1880. **Kaolinite.** Amherst.

Well at northwest corner of College Grove.

Green, soft lithomarge from decomposition of orthoclase, muscovite, and fibrolite of coarse granite, and forming pseudomorphs of these minerals. It represents the surface of the granite which has been rotted beneath the Triassic sandstones, now newly exposed by glacial erosion.

Analyses made in the laboratory of Amherst College.

	No. 1.	No. 2.	No. 3.
SiO_2	46.96	44.39	46.50
Al_2O_3	28.01	33.54	35.62
Fe_2O_3	3.14	2.13	
MgO	3.58	6.41	4.54
K_2O			2.59
H_2O	11.14	12.60	11.57
	92.83	99.07	100.82

1882. **Kaolinite.** Deerfield.

"Along the shore in Greenfield, opposite Turners Falls, and especially on the new road between these towns, the nodules of the radiated prehnite are in whole or part changed into a white kaolin (?), the change uniformly commencing from the different centers of radiation and proceeding regularly outward. Under the microscope the kaolin-like material separates into opaque granules so extremely minute that they show in water the Brownian movement with wonderful perfection."

B. K. Emerson: The Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 349.

1883. **Kaolinite after garnet.** Bernardston.

In the Leyden argillite, on the north line of Bernardston, minute garnets have been changed to a mass of soft clay, which still fills the cavities.

1888. **Kaolinite.**

The thin laminated clays of Champlain age which rest directly on the till in the Connecticut River valley and those of the Brimfield Lake will be described in full in the monograph on the geology of the region. They are extensively worked for brick in Turners Falls, Greenfield, Northampton, Amherst, Holyoke, Chicopee, South Hadley, Springfield, and Brimfield.

1890. **Kaolinite.** Blandford.

Extensive works have been erected by the Blandford Brick and Tile Company in Russell to work a deposit of clay found in Blandford many years ago by Mr. G. L. Twitchell.

"Sworn analyses by chemists of the Massachusetts Institute of Technology show the existence of a bed of kaolin * * * of the most valuable sort and in a quantity that is known to exceed 80,000 tons. * * * A comparative analysis shows that the Blandford clay is superior to the Mount Savage clay, the only American basis for fire brick that is worthy of notice, and even to the Sturbridge clay from England and the Chinese kaolin. Its finer strain makes a brick of the purest white."

Springfield Republican, December 6, 1890.

1890. Kaolinite. Blandford.

Situated just east of the village and due to the preglacial decomposition in situ of veins of coarse feldspathic pegmatite.

Analysis.

[By Dr. L. M. Norton, Institute of Technology.]

SiO_2	52.03
Al_2O_3	31.76
H_2O	15.55
MgO	.54
Fe_2O_3	Trace.
CaO	Trace.
Alkalies	Trace.
	99.88

W. O. Crosby: The Kaolin in Blandford, Mass.; Technology Quarterly, Vol. III, p. 228.

KALINITE.

1818. Native alum. Leyden.

Efflorescing in small quantity on argillaceous slate.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. 1, p. 114.

1824. Alum. Ware, in mica-slate.

C. U. Shepard: Min. Loc.; ibid., Vol. VIII, p. 235.

1825. Alum.

Conway, on mica-slate; Leyden, in carbonaceous clay; Ware, in mica-slate.

Robinson's Cat., pp. 45, 56, 73.

1835. Alum. Ware.

In gneiss.

E. Hitchcock: Geol. Mass., p. 398.

1841. Alum. Conway, northeast part.

Abundant.

Ibid., p. 604.

The pyritous Hawley schists and the rusty fibrolite Brimfield schist along the eastern border of the area show abundant white efflorescences of mixed iron and alumina sulphates.

KEROLITE.

See Bastite and Deweylite.

KILLINITE.

See Muscovite, 1879.

KNEBELITE.

1880. Knebelite. Plainfield.

There was in the Shepard collection (now burned) a specimen labeled by Professor Shepard "Tephroite, knebelite, $Mg(Fe)SiO_3$." It was dull yellowish-brown in color and of fibrous texture, apparently common hornblende.

LAUMONITE.

1835. Laumonite.

In amygdaloid in Massachusetts in small masses.
C. U. Shepard: Min., Part II, Vol. II, p. 3.

1835. Laumonite.

Doubts its occurrence.
E. Hitchcock: Geol. Mass., p. 436.

1841. Laumonite.

Not found in greenstone in Massachusetts.
E. Hitchcock: Geol. Mass., p. 662.

1876. Laumonite. Monson.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 4.

1882. Laumonite. Monson.

Large pieces of massive laumonite, white to pink, from Monson quarry. In a north-south fissure in the north end of the quarry the gneiss is much decomposed and the fissure filled with laumonite, massive, granular, and in quite large finely terminated crystals, ∞ P (110) — P ∞ (100), 26 mm. long, 1½ mm. wide. The vein is permeated with bands of leek-green hornstone.

1886. Laumonite. Northampton. Quarry in granite south of W. N. Moore's, east of Florence.

Hollow pseudomorphs of albite after laumonite; fine drusy without and within, 10 mm. long ∞ P (110) — P ∞ (101). They rest on laumonite and quartz.

LAZULITE.

1893. Lazulite. Greenfield.

In 1892 Mr. C. C. Russell, of the class of 1894 in Amherst College, picked up in the bed of Hinsdale Brook a white vein-quartz bowlder nearly 4 inches long and 2½ inches square on cross section, having a glacial shape, smoothed on the four sides and rough on the ends, but later considerably waterworn. The half of one side is of deep azure blue of the shade of the Chrowder's Mountain lazulite and deeper than that of Grave's Mountain, Georgia. It is in squarish cross sections of imperfect crystals nearly half an inch across and the material extends a half inch into the mass.

The quartz is a clear, white, greasy, vein quartz, which has parallel to a plane of schistosity thin films of magnetite, and these graduate into films of a magnetite-muscovite-fibrolite schist. I am wholly at a loss to locate this schist in any region from which the ice could bring the bowlder to this place, since fibrolite is wholly wanting in the rocks to the west and northwest across the Green Mountains, so far as I have examined them. The only other locality for lazulite in the United States is in Georgia.

LEPIDOLITE.

1835. Lepidolite.

"Dr. Emmons is of opinion that the 'large cleavable variety' of crystals occurs at Goshen. Probably he refers to the mineral that has generally been regarded as rose mica."
E. Hitchcock: Geol. Mass., p. 504.
This was doubtless muscovite.

1879. Lepidolite. Chesterfield, in cleavelandite.

A. A. Julien: Ann. N. Y. Acad. Sci. Arts, Vol. I, p. 351.

LIMONITE.

1818. Eagle stone, or nodular argillaceous oxide of iron. Deerfield.
One specimen on banks of Deerfield River.
E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 116.

1819. Bog iron ore. Greenfield, Warwick.
E. Hitchcock: Sup. to Geol. Deerfield; ibid., Vol. I, p. 436.

1823. Nodular argillaceous oxide of iron. Gill, near Falls, in dark hard slate of coal formation.
E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 233.
This refers to the abundant flattened egg-shaped concretions of pyrite changed to limonite found in the Triassic slate.

1827. Iron bed; bog iron ore. Williamsburg.
One-half mile below village, 30 rods south of Northampton road.
A. Nash: Lead mines, etc.; ibid., Vol. XII, p 258.

1832. Limonite. Greenfield, Northampton, Springfield, Williamsburg.
E. Hitchcock: Geol. Mass.; Am. Jour. Sci., 1st series, Vol. XXII, p. 55.

1835. "Vitreous black oxide of iron." Southampton lead mine.
E. Hitchcock: Geol. Mass., p. 507.

1835. Limonite, nodular. Gill, in slate of the coal formation.
C. U. Shepard: Min., 1st ed., Part II, Vol. II, p. 15.
(See 1823, above.)

1838. Ocher. Monroe.
No. 162 in State collection from Morton Ballou; formerly dug for paint; abandoned.
E. Hitchcock: Report on Economical Geol., p. 128.

1841. Bog ore. Warwick, Greenfield, Northampton, Springfield, Williamsburg.
E. Hitchcock: Geol. Mass., p. 198.

1852. Limonite. Gill, in slate of the coal formation.
C. U. Shepard: Min., 3d ed., p. 277.

1865. Ocher and sienna. East Whately.
Discovered and used above fifty years ago; is on land of Elihu Belden; called American sienna; used mixed with milk as a paint. Covers one-half acre 30 rods from Connecticut, in a long depression in the meadow extending from north to south. Is immediately below turf, 10 to 30 inches thick; rests on loam. Probably a spring deposit, very homogeneous and fine grained; ocher sienna-brown, and when ignited a red to burnt sienna.

Analysis.

	SiO_2.	Fe_2O_3.	Al_2O_3.	H_2O.	Total.
Deepest yellow	13.00	70.00	3.60	13.00	99.60
Do	20.00	63.30	5.00	11.70	100.00
Yellowish-brown	47.00	35.00	6.00	10.80	98.30
Brown	53.00	28.00	6.00	13.00	100.00
Pale yellow	63.00	17.50	7.00	12.50	100.00

Highly commended.
Report of Prof. Charles Upham Shepard's analysis of the East Whately ocher and sienna mine; Amherst, Mass., January 18, 1865.

1865. **American sienna.** Whately.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 2.

1876. **Humoferrite.** (Shepard.) Whately.

C. U. Shepard, Cat. of Min. within 75 miles of Amherst College.

"Its true character is that of a light river sediment highly charged with peroxide of iron, which ingredient forms one-sixth to three-fourths of its weight."

C. U. Shepard: Report Whately ocher and sienna mine, p. 4.

(Name not adopted.)

1876. **Melinine.** (Shepard.) Turners Falls.

C. U. Shepard: Ibid., p. 4. (See Limonite, 1823. The name has never been adopted.)

1879. **Bog iron.** Brimfield.

Formerly worked to considerable extent on farm of Charles Bugbee, since occupied by Michael Travers.

Hist. Conn. Valley, Vol. II, p. 994.

1891. **Limonite.** Bernardston.

Impregnates and replaces the limestone at Williams's farm in quite large amount.

1891. **Limonite after calcite.** Loudville lead mine.

Form ∞ P, $-\frac{1}{2}$ R, 5 mm. long; on quartz.

In Clark collection, Smith College.

LINARITE.

1891. **Linarite.** Manhan lead mine, Loudville.

In deep blue-bladed crystals in a cavity in quartz, determined by Professor Shepard. As there are only two small crystals known, no attempt was made to verify the occurrence. Color and form agree well with linarite.

Specimens in Amherst and Smith College collections.

LINCOLNITE.

1831. **Lincolnite.** See Heulandite.

MAGNETITE.

1818. **Iron sand.** Turners Falls, Montague side.

Considerable quantity.

E. Hitchcock: Geol Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 115.

1818. **Magnetic oxide.** Common west of the Connecticut River.

Ibid.

1822. **Magnetite.** Middlefield.

Octahedrons in mica-slate (Eaton).

Cleaveland: Min., Vol. II, p. 596.

1823. **Magnetic oxide of iron.** Plainfield, Shelburne, Shutesbury, etc.

In small octahedrons in mica slate and gneiss. Hawley, in beds in talcose slate. Bernardston, in beds.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 232.

1824. **Magnetic oxide of iron.** Plainfield, Cummington.

Plainfield, cubic crystals in arenaceous quartz. Cummington, with cummingtonite (Dewey).

J. Porter: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VIII, p. 233.

1825. **Magnetite.** Zoar, Hawley.

Octahedra in chlorite.

Robinson's Cat., pp. 52, 78.

1825. **Magnetic oxide of iron.** Cummington.

J. Porter: Min. Loc.; Am. Jour. Sci., 1st series, Vol. IX, p. 55.

1826. **Magnetic oxide of iron.** Plainfield.

A small bed has lately been discovered.

J. Porter: Min. Not.; ibid., Vol. X, p. 18.

1826. **Magnetic iron.** Monson.

Abundant in gneiss.

S. Colton: Min. Not.; ibid., p. 13.

1833. **Magnetic oxide of iron.** Hawley.

Principal ore magnetic oxide; not abundant; bed rarely more than 1 to 2 feet wrought; now abandoned; owned by Hon. Samuel C. Allen. Appears 1 to 2 miles south and 2 to 3 miles north in Charlemont. (See Hematite.)

E. Hitchcock: Geol. Mass., p. 53.

1835. **Magnetic oxide of iron.** Blandford, Chester.

Octahedra in mica-slate.

Everywhere in the "chlorite slate."

Ibid., pp. 347, 363.

1838. **Magnetite.** Warwick.

Probably the most extensive in the State. Attempt to work it abandoned because of impurity. No. 177 in State cabinet; from Alden Spooner.

Analysis.

Fe_3O_4	66.4
MnO_3	16.6
SiO_2, Al_2O_3	17.0
	100.00

E. Hitchcock: Economic Geol., p. 124.

1841. **Magnetite.** Chester, Blandford, Warwick, Bernardston.

Chester. In talcose slate. The beds of magnetic oxide of iron in the west part of Chester, which are nearly a foot wide, occur in hornblende slate; but this appears to me to be interstratified with the talcose slate, so that probably the ore should be regarded as a continuation southerly of the beds in Hawley.

Blandford. Association not known.

Warwick. Near east line in mica-slate; at least two beds several feet wide; ore abundant, very compact; sp. gr. 4.47.

Analysis.

Fe_2O_3	46.34
FeO	20.70
SiO_2	15.28
MnO	7.92
MgO	4.18
CaO	4.88
Loss	.70
	100.00

1841. **Magnetite**—Continued.

Bernardston. Near the limestone.

Analysis.

Fe_2O_3	57.86
FeO	29.98
SiO_2	9.90
MgO	5.42
MnO	.54
Loss	.30
	100.00

E. Hitchcock: Geol. Mass., pp. 194, 612.

1841. **Magnetic oxide of iron.** Blandford, Chester.

Octahedra; in mica slate. Ibid., p. 607.

1841. **Magnetic oxide of iron.**

In chlorite slate; abundant; also more rarely in talcose slate.
E. Hitchcock: Ibid., p. 613.

1841. **Magnetic oxide of iron.**

In small disseminated masses in Shelburne in gneiss.
Ibid., p. 637.

1865. **Magnetite.** Chester.

Massive, thin-veined, granular, and disseminated. Massive variety perfectly pure and unmixed between the coarse-grained Lake Champlain ore and the fine-grained Swedish. In fracture slightly purplish tint, blacker than usual, free from pyrite and rust, no native magnets; magnetic with polarity. On top of North Mountain a continuous seam 10 to 15 inches wide in a chloritoidal vein 4 to 5 feet wide of disseminated magnetite; this forks off from the main vein on the east at 30° in talcose slate, sunk upon 25 feet. No emery; seen again 600 feet on; also on South Mountain 6 to 8 inches thick; has trace of titanium.

C. U. Shepard: Report Chester emery mine.

1886. **Magnetite.** Monson, Flint's quarry.

In broad sheets of muscovite in flattened reticulated bands, twinned after the octahedron, as at Liepersville, Pa., and almost rivaling it in beauty. From the pegmatite of the east wall of the quarry. Best specimens in Amherst College cabinet.

1891. **Magnetite.** Hawley.

This mineral is abundant the whole length of the vein on Forge Hill, replacing the better-known hematite in the bottom of the new shaft sunk at the old mine. It lies in a quartz vein in sericite schist.

1891. **Magnetite.** Plainfield, Charlemont.

Plainfield. Abundant in the continuation of the Hawley vein across this town, associated with rhodonite.

Charlemont. In a considerable vein in the south brow of the hill 1 mile north of village, and in fine octahedra in hornblende chlorite-schist near A. P. Maxwell's.

MALACHITE.

1818. **Green carbonate of copper.** Greenfield.

In greenstone vein on bank of the Connecticut River, passing under the river; not wrought.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 115.

1823. **Green carbonate of copper.** Greenfield.

Two veins considerably abundant; amorphous and earthy.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 231.

1881. **Malachite.** Leverett, Hatfield.

Occurs as coating and small tufts at new opening of Upper Leverett mine, and at Hatfield mine.

1888. **Malachite.** Loudville lead mine.

In layers 10 to 15 mm. thick and in fine tufted groups on chrysocolla; rare; finest specimens in Smith College and Amherst College collections.

1890. **Malachite.** Chester.

In hornblende schist in the shaft of the emery mine; broad films on cleavage planes. Especially abundant in a peculiar olive-green serpentine.

MANGAN-AMPHIBOL.

See Rhodonite.

MARCASITE.

1835. **White iron pyrites.** Cummington and Plainfield with cummingtonite.

C. U. Shepard: Min., 1st ed., Vol. II, p. 159.

1841. **White iron pyrites.** Same.

E. Hitchcock: Geol. Mass., p. 608.

1886. **Marcasite.** Cummington, Mass., and throughout western New England.

Massive and fibrous in mica-schist.

The pyrite of Charlemont is cited as pyrrhotite and pyrite, that of Rowe as pyrite.

A. A. Julien: Decomposition of iron pyrites; Ann. N. Y. Acad. Sci., Vol. III, p. 398.

(All these occurrences are in one band of rock, and I have rarely failed to find cubical crystals at any locality and have never seen rhombic or fibrous forms. Professor Julien's careful studies make his determinations conclusive as to the presence of marcasite with the other sulphides.)

MARGARITE.

1865. **Margarite.** Chester.

"I found that the minerals margarite and chloritoid in talcose hornblende and mica-slate rocks indicated the occurrence of emery."

C. T. Jackson: Am. Jour. Sci., Vol. XXXIX, p. 87.

1865. **Margarite.** Chester.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XL, p. 112.

1865. **Margarite.** Chester.

Scarcely less characteristic of emery than diaspore, harder and more basic than mica, nonalkaline, frequently with a richness of crystallization and color nowhere else known. Always in near proximity to the purest masses of emery, sometimes traversing it in veins, at others coating more or less perfectly large and small rounded masses of it with layers an inch or more in thickness. Laminæ transverse; sometimes open spaces in middle of margarite seam show terminated crystals, but rarely with crystals of corundophyllite; emery grains everywhere; pinkish, rarely disseminated in emery with epidote; gray and resembles mica.

C. U. Shepard: Report of Chester emery mine, p. 10.

1866. **Margarite.** Chester.

Analysis.

SiO_2	32.21
Al_2O_3	48.87
CaO	10.02
FeO	2.50
MnO	.20
MgO	.32
Na_2O (K_2O)	1.91
LO	.32
H_2O	4.61
TiO_2	Trace.
	100.96

J. L. Smith: Am. Jour. Sci., 2d series, Vol. XLII, p. 90.

1866. **Margarite.** Chester.

Analysis by J. C. Jackson and C. T. Jackson.
Ibid., p. 107.

1885. **Margarite.**

The largest crystals that have come to my notice (100 mm. long), as well as the thickest veins of the mineral (65 mm.), are in the Clark cabinet in Smith College.

The mineral has widely divergent optical axes, and in the large crystals, which show plumose structure on cleavage planes, the successive laminæ of the crystal are placed with their axes making a considerable angle with the axis of the composite crystal, so that in a plate of sufficient thickness exactly the same effect is produced as by building up plates of muscovite with the axes in each plate diverging more and more from the first.

1891. **Margarite.** Pelham asbestos mine.

In connection with the seam of deep blue corundum crystals, bordering the top of the olivine bed, one fine specimen of margarite has been found. Pale pink plates one-half inch across in fine dark bronze biotite. A second piece shows a fine drusy surface of satiny luster and pale-green color, formed by the terminations of many minute implanted crystals, presenting a common face to the surface. Form 0 P (001), ∞ P ∞ (010), ∞ P (100). The specimens were presented to the cabinet of Amherst College by Mr. B. F. Merrill.

MARMOLITE.

See Bastite.

MELANITE.

See Garnet, 1818.

MELANTERITE.

1818. **Sulphate of iron.** Conway.

Small quantity on mica-slate.
E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 115.

1823. **Sulphate of iron.** Hawley.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 233.

1892. Melanterite.

Efflorescence of iron sulphate is not uncommon in the Hawley schists, where pyrite is so abundant, and in the rusty Brimfield schists along the eastern border of the area. The local names "copperas rock" and "dye stone" indicate this.

In the band of rocks running under the western edge of Amherst village the sulphate is so abundant that the well waters sometimes blacken tea.

MELININE.

1876. Melinine (yellow ocher). (Shepard.) Turners Falls.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 3.

See Limonite, 1823. Unused synonym.

MENACCANITE.

1824. Oxyd of titanium. Chester.

"Likewise, I have seen the oxyd of titanium in plates in mica-schist."

E. Emmons: Lec. Min.; Am. Jour. Sci., 1st series, Vol. VI, p. 255.

1835. Iserine.

Some of the iron sand from the banks of the Connecticut River, 40 rods below Turners Falls, Montague side, not magnetic, and resembles iserine.

E. Hitchcock: Geol. Mass., p. 231.

1842. Washingtonite. (Shepard.) Goshen.

With spodumene, in thin folia.

C. U. Shepard: Am. Jour. Sci., Vol. XLIII, p. 366.

1844. Washingtonite. (Shepard.) Goshen.

F. Alger: Min., p. 381.

1846. Ilmenite, Washingtonite.

Analysis by J. L. Kendall:

TiO_2	25.28
Fe_2O_3	51.84
FeO	22.86
	99.98

Is identical in chemical composition and crystalline form with ilmenite.

F. Alger: Location of rare minerals and mines of supposed distinct species; Bost. Jour. Nat. Hist., Vol. V, p. 383; also Am. Jour. Sci., 2d series, Vol. I, p. 122.

1865. Ilmenite. Chester.

Thin, curved laminæ with margarite.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XL, p. 112.

1865. Washingtonite. Chester.

Emery vein; rare, black, foliated, much-curved laminæ between the double seams of margarite.

C. U. Shepard: Report of Chester emery mine, p. 11

1865. Washingtonite. Chester.

In the principal veins (layer veins) of white quartz that the large crystals of Washingtonite were found in, at one spot within a mile from the northern end of the emery vein.

C. U. Shepard: Discovery of emery mine, Chester; note, p. 5.

(There were in the Shepard collection, destroyed by fire, great tabular crystals 6 to 8 inches across and 1 inch thick of model-like perfection from the locality in Chester mentioned above. They were tabular by the predominance of 0. I can not find that they were ever described by Professor Shepard.)

1866. **Menaccanite.** Chester.
Flattened crystals in margarite.
J. L. Smith: Am. Jour. Sci., 2d series, Vol. XLII, p. 92.

1876. **Menaccanite.** Pelham, Ware.
C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 7.

1876. **Washingtonin.** Chester.
Ibid.

1880. **Menaccanite.** Blandford. Bartholomew's soapstone quarry.
In large plates in quartz in roadside opposite the quarry.

1881. **Menaccanite.** Ware.
In dull-black, flat crystals up to 1 inch; perfect and abundant in coarse granite near the railroad cut at Gilbertville.

1881. **Menaccanite.** Chester emery mine.
Massive in veinlets in emery; in beautiful, broad, finely striated scales bordering 1-inch vein of margarite and cutting corundophyllite.

1882. **Menaccanite.** Northfield. Calvin Swan's place.
Broad, thin plates in transparent quartz.
In W. E. Webster's collection in Northfield.

1891. **Menaccanite.** Hawley.
In quartz veins adjacent to the magnetite-hematite veins in very fine, large, curved plates in white quartz south of Forge Hill.

MICROCLINE.

1818. **Feldspar.** Deerfield, in pudding-stone.
E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. I, p. 113.

1823. **Adularia.** West Springfield. Southampton lead mine (Waterhouse).
In perfect crystals in coarse granite.
E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 221.

1824. **Green feldspar.** Chesterfield.
"While on a visit to the locality of sappare in that place, I found near the spot where the sappare is obtained fine specimens of green feldspar in granite and associated therewith the siliceous oxide of manganese (rhodonite). It contains small octahedral crystals of magnetite."
C. U. Shepard: Loc. Min.; ibid., Vol. VII, p. 251.

1825. **Green feldspar.** Chesterfield. Green.
Chester; pale-green color, not uniform in structure, foliated, less luster than lighter varieties. Glossy quadrangular prisms in quartz, abundant (Emmons).
C. Dewey: Geol. Berkshire County; Am. Jour. Sci., 1st series, Vol. VIII, p. 43.

1825. **Green feldspar.** Chesterfield.
In crystals, in masses; fine; near cyanite location in granite.
Robinson's Cat., p. 43.

1835. **Feldspar.** Pelham.
Feldspar crystals with actinolite, augite, and sphene.
E. Hitchcock: Geol. Mass., p. 398.

1841. Feldspar. Belchertown.

In gneiss in Three Rivers. Small but well-defined crystals, primary form with truncation of solid angles, in drusy cavities in tortuous gneiss; also on railroad in Middlefield; Leverett, blue; Goshen, green.

E. Hitchcock: Geol. Mass., pp. 637, 639, 703.

1852. Feldspar. (**Adularia.**) Palmer, Middlefield.

Most interesting crystallizations.

C. U. Shepard: Min., 3d ed., p. 189.

1876. Blue microcline. Hadley.

From coarse granite dike in Mount Warner, Hadley.

Analyzed by J. Keep, of the class of 1874, Amherst College:

	No. 1.	No. 2.
K_2O	11.62	11.03
Na_2O	3.72	3.90
	15.34	14.93

1876. Microcline. (Des Cloizeaux.) Everett (correctly Leverett).

Des Cloizeaux: Un microcline blanc d'Everett, Mass., U. S. A.; Compt. Rendu, Vol. LXXXII, p. 889.

Professor Shepard informed me that the microcline of Leverett furnished by himself was one of those originally investigated by Des Cloizeaux. As there is no rock in Everett, Mass., which could furnish the mineral, the citation above originated doubtless from reading Leverett "L'Everett" on Professor Shepard's labels.

1876. Microcline. L'Everett.

Analysis by Pisani.

SiO_2	64.97
Al_2O_3	21.47
MgO	.32
K_2O	12.20
Na_2O	1.78
Ign	.81
	101.55
Sp. gr	2.47

Des Cloizeaux: Ann. Ch. Phi., Vol. IX, p. 433.

1880. Microcline. Amherst.

West of middle of long dike east of North Amherst.

Pegmatitic nodules in feldspathic mica-schist, same as original locality in Leverett, changing into a silvery-white muscovite along planes of the following cleavages, which are placed in order of clearness of development: $'\infty P'$, 0 P, $\infty P \breve{\infty}$, $\infty P \dot{\infty}$. They are in the progress of and as a result of the decomposition of the feldspar and its change to muscovite. Under the microscope the nodules show the structure of microcline. They gave 15 per cent alkali, mostly K_2O.

1880. **Quartz and feldspar.** Hampden County.

Number of mines	2
Capital	$254,000
Hands	23
Wages	$12,300
Value of material (per ton)	$1,600
Product, tons	3,400
Product, value	$44,000

U. S. Census, 1880, Vol. XV, p. 844.

(This refers to the mines of the Pontoosuc flint mills in Blandford, and probably to the quarry near Knightsville in Huntington.)

1885. **Microcline.** Pelham, Monson, Huntington, Russell, Granville, Blandford.

Pelham; occurs in distinct large crystals 7 cm. long; ∞ P ∞, ′∞ P′, 0 P, P ∞, P; white with trace of pink in coarse granitic segregations in Pelham gneiss, Buffom's quarry, T. J. Aldridge, owner.

Monson; in large, nearly transparent, cleavable masses in coarser portions of the gneiss at the south end of Flynt's quarry.

In Huntington the large masses with the spodumene on Norwich Hill often have the green color of Amazon stone.

Russell; left bank of the river, opposite Lower Salmon Falls.

Granville; near Munns Brook.

Blandford; north line at feldspar quarry; fine large cleavable masses and many well-formed crystals a foot on a side.

1889. **Microclin.** Huntington.

"A considerable force of men is at work on the farm of George D. Lyman, near Knightville in Huntington, blasting for feldspar. If found in paying quantities, it is proposed to build a mill near by for crushing it."

Springfield Republican, April 18, 1889.

(Fine white microcline occurs in large masses forming a giant pegmatite.)

MICROLITE.

1835. **Microlite.** Chesterfield.

Full mineralogical description, O, O ∞ O, 2 O 2. In albite; conjectures that the principal ingredient is oxide of cerium.

C. U. Shepard: Microlite, a new mineral species; Am. Jour. Sci., 1st series, Vol. XXVII, p. 361.

1835. **Microlite.** Chesterfield.

Octahedral tungstic baryte.

Full description and figures, O, ∞ O, O, 2 O 2. Its chief ingredient is probably the oxide of cerium. Largest crystals, 0.4 gr.

C. U. Shepard: Min., Part II, Vol. II, p. 45.

1837. **Microlite.**

Analysis.

CbO	75.70
CaO	14.84
WO_3, YO, UO	7.42
HO	2.04
	100.00

C. U. Shepard: Chemical examination of microlite; Am. Jour. Sci., 1st series, Vol. XXXII, p. 338.

1841. **Microlite.** Chesterfield.

A new mineral, chiefly an oxide of cerium.

E. Hitchcock: Geol. Mass., p. 704.

1842. **Pyrochlore.** Chesterfield.

Transparent straw-yellow to brick-red and black, the transparent and smaller crystals being beautifully modified.

Analysis by A. A. Hayes:

TiO_2	80.0
SnO, FeO, CeO, UO	11.8
CaO	8.2
	100.00

J. E. Teschemacher and A. A. Hayes: On the identity of pyrochlore with the microlite of Professor Shepard; Am. Jour. Sci., 1st series, Vol. XLIII, p. 33.

1842. **Microlite.** Chesterfield.

Maintains the species microlite and gives chemical proof that it is a columbate of lime and yttria.

C. U. Shepard: Want of identity between microlite and pyrochlore; Am. Jour. Sci., 1st series, Vol. XLIII, p. 116.

1844. **Pyrochlore.**

"The close examination of above 200 crystals of the mineral named microlite by Professor Shepard * * * indicated to me in 1841 the complete identity of the mineral with pyrochlore. This identity, strenuously resisted by Professor Shepard, though on grounds which show a very superficial acquaintance with the whole subject, has been completely proved by subsequent analyses, particularly by that of A. A. Hayes (Am. Jour. Sci., 1st series, Vol. XXXII, p. 341), and its station as a columbate of lime, according to one of Shepard's analyses, confirmed. My largest crystal is three-eighths of an inch at base of pyramid."

J. E. Teschemacher: Bost. Jour. Nat. Hist., Vol. IV, p. 501; Philos. Mag. of London, Edinburgh, and Dublin, 1844.

1844. **Microlite?.** Chesterfield.

Mr. Teschemacher has called my attention to some minute transparent yellow and highly brilliant crystals which, with columbite and microlite, are found in the Chesterfield granite. They have the characters of a columbite, but differ from true microlite. Mr. Teschemacher has a crystal of microlite much modified by an uranium mineral crystallized with it. Generally the yellow stains on the albite are the most marked indications of the existence of microlite crystals.

Note: A. A. Hayes; Am. Jour. Sci., 1st series, Vol. XLVI, p. 159.

1844. **Microlite.** Chesterfield.

Acknowledges error in calling the mineral a titanate in previous analysis and communicates new analysis of microlite and of the foreign pyrochlore, from which he concludes that they are the same mineral.

A. A. Hayes: Reexamination of microlite and pyrochlore; ibid., p. 158.

1845. **Microlite.** Chesterfield.

Maintains its identity with pyrochlore and explains the specific gravity by the greater quantity of columbic acid, 80 per cent, as against 53 per cent in pyrochlore.

J. E. Teschemacher: Am. Jour. Sci., 1st series, Vol. XLVIII, p. 395.

1845. **Microlite.** Chesterfield.

"The dimensions of the controversy to which this little mineral has already given rise seem half entitled to place it under gigantolite." In answer to Hayes's chemical reexamination of the mineral and interpretation of his (Shepard's) results, Shepard quotes Berzelius's Report of Progress, where he concludes from the researches published that the mineral is only a yellow yttro-tantalite. Shepard concludes that "the whole mineralogical question then—if there still be any—comes back to the point where I had left it, viz, to the difference in regard to gravities. Pyrochlore has a gravity of 4.20 to 4.32; microlite, 5.48 to 5.646. As soon as Mr. Teschemacher with his 200 crystals (which is a twenty-fold greater number than I have had the good fortune to see) shall by simple observation with the balance cause this discrepancy to disappear, etc., then the species will disappear."

C. U. Shepard: Ibid., p. 177.

1852. **Microlite.** Chesterfield.

Description.

C. U. Shepard: Min., 3d ed., p. 248.

1868. **Microlite.** Chesterfield.

From blowpipe investigation suggested by Brush to be probably a pyrochlore in which tantalic acid replaces the columbic, this corresponding with the high specific gravity and larger percentage of the metallic acid. (?) $[CaO,MnO]TaO_5$.

J. D. Dana: Min., p. 514.

1892. **Microlite.** Chesterfield.

E. S. Dana: Min., p. 728.

MOLYBDENITE.

1818. **Molybdena.** Shutesbury, on land of William Eaton.

Crystals flat six-sided prisms 1 inch or more in length; in ledge 6 to 7 feet above surface of earth, 10 to 12 feet above water.

E. Silliman: Not. of Min. Loc.; Am. Jour. Sci., 1st series, Vol. I, p. 238.

1819. **Sulphuret of molybdena.** Brimfield.

In granite traversing gneiss; very common.

A. Eaton: Min. Loc.; ibid, Vol. II, p. 238.

1820. **Sulphuret of molybdena.** West Brimfield.

Granite, discovered by Dr. A. Lincoln.

A. Eaton: Index, p. 94.

1822. **Molybdena.** Middlefield.

In actynote and steatite.

C. Dewey: Min. Loc.; Am. Jour. Sci., 1st series, Vol. V, p. 268.

1823. **Sulphuret of molybdena.** Brimfield (Eaton).

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 235.

1824. **Molybdenite.** Chesterfield.

Dr. J. Porter: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VII, p. 58.

1824. **Sulphuret of molybdena.** Chesterfield.

Six-sided prisms in quartz.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 58.

1825. **Molybdena.** Goshen.

In granite.

J. Porter: Min. Loc.; ibid., Vol. IX, p. 55.

1825. **Molybdenite.** Chesterfield, Goshen, Middlefield

In actinolite and steatite.

Robinson's Cat., pp. 43, 51, 59.

1828. **Molybdena.** Shutesbury.

"Went in search of location mentioned in American Journal of Science (1st series, Vol. I), on land of William Eaton; could not find any such person nor ascertain that he ever owned land in that place, though he was recollected. Ascertained at length that the spot was on land of Mr. Pratt, in the extreme northern part of the town, close by a common chalybeate spring. In granite in mica-slate. Few specimens to be obtained without blasting."

E. Hitchcock: Min. Ex.; Am. Jour. Sci., 1st series, Vol. XIV, p. 217.

1835. **Molybdenite.** Shutesbury.

Figured.

C. U. Shepard: Min., Part II, Vol. II, p. 52.

1835. **Sulphuret of molybdenum.**

Said to have been found in Middlefield steatite.

E. Hitchcock: Geol. Mass., p. 363.

1838. **Sulphuret of molybdenum.** Brimfield.

With iolite, 1½ miles northeast of village, land of Samuel Patrick. Abundant in dots.

J. W. Foster: Am. Jour. Sci., 1st series, Vol. XXXIII, p. 400.

1841. **Sulphuret of molybdenum.**

Shutesbury; Lock's Pond: In hexagonal plates nearly an inch in diameter in gneiss.

In bowlder in gneiss in Pelham, Middlefield.

E. Hitchcock: Geol. Mass , pp. 613, 637.

1844. **Molybdenite.** (*Elasmites hexagonus.*) Shutesbury.

J. D. Dana: Sys. Min., p. 500.

(I have not been able to verify any of the above localities except that at Shutesbury. The Brimfield iolite occurs in small granite veins in the highly graphitic Brimfield schist. I have not been able to find molybdenite at the locality, and probably graphite was mistaken for it.)

1894. **Molybdenite.** Chester.

In vein in chloritic hornblende-schist with pale-green epidote from the upper portion of the main shaft at the emery mine.

In distinct tabular crystals, apparently P, 0 P, ∞ P. P striated; 0 P depressed to a regular six-faced, hopper-shaped cavity, suggesting the idea that it may be a twinned crystal in the rhombic system.

MONTMORILLONITE.

1825. **Carbonate of manganese.** Goshen.

The spodumene is almost uniformly invested with a very thin coating of carbonate of manganese; in the interior pulverulent and delicate rose-red; at the surface brownish-black.

C. U. Shepard: Bost. Jour. Phil. and Arts, Vol. III, p. 607.

1876. **Quincite.** Goshen.

C. U Shepard: Cat. of Min. within 75 miles of Amherst College.

This refers, as specimens in the Shepard collection with the author's label showed, to the pink coloring films upon the altered spodumene. I know no evidence except color which could cause one to assign the substance to the limestone mineral quincite, and I prefer to follow Dana and Brush in assigning it to montmorillonite.

1879. **Montmorillonite.** Norwich (now Huntington).

"By the deposit of a pink substance at Norwich acting as a characteristic coloring film upon spodumene."

A. A. Julien: Spodumene and its alterations; Ann. N. Y. Acad. Sci. Arts, Vol. I, p. 326.

1886. **Montmorillonite.** Southampton.

In thin, pink, botryoidal crusts at the Loudville lead mine on decomposed granite.

1891. **Montmorillonite.** Belchertown.

Similar crusts upon the fissures in the mixture of granite and hornblende schist at Kellys Crossing.

MUSCOVITE.

1818. **Mica.**

Abundant east of the Connecticut River. In crystals in Amherst.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 113.

1820. **Mica.** Chester or Westfield.

Hexagonal crystals in granite.

Chester Dewey: Loc. Min.; ibid., Vol. II, p. 237.

1823. **Mica.**

Cummington and Plainfield, green; Williamsburg, white and yellowish, abundant.

J. Porter: Loc. Min.; ibid., Vol. VI, p. 248.

1823. **Mica.**

Leverett; laminated, lamellar. Goshen, yellowish-green and violet, and sometimes in rhombic tables (Gibbs).

Most of the mica in the granite veins in Conway, Ashfield, Williamsburg, Chesterfield, etc., is straw-yellow, sometimes rose-red, and in these veins it exists in excess. It occurs in these and other towns, also in granite and of a smoky or nearly black color.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 220.

1824. **Prismatic and tabular mica.** Norwich (Huntington).

Abundant and very beautiful at White Rocks, one-half mile west of and visible from Pitchers Ridge. In coarse granite.

E. Emmons: Ibid., Vol. VII, p. 254.

1824. **Prismatic mica.** Chesterfield and Goshen.

Abundant.

J. Porter: Min. Loc.; ibid., Vol. VII, p. 253.

1824. **Mica, prismatic.** Chester.

Fibrous, very fine, passing into prisms; also Worthington; Williamsburg, plumose.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 41.

1825. **Mica.** Goshen.

Green, rose, and silver colored; also beautiful white talc, which I believe has not been credited to this locality (= cymatolite).

E. Hitchcock: Min. Loc.; ibid., Vol. IX, p. 21.

1827. **Plumose mica.** Williamsburg.

Six inches long.

A. Nash: Lead mines of Hampshire County; Am. Jour. Sci., 1st series, Vol. XII, p. 260.

1835. **Plumose mica.** Williamsburg; several places west and northwest of the village.

E. Hitchcock: Geol. Mass., p. 504.

1841. **Mica.**

Chesterfield and Goshen; rose-red, delicate yellow, transparent, and silver. Northwest of Norwich, nearly 2 feet in diameter. Prismatic mica in Goshen, Chesterfield, Norwich, Leverett; best at Russell. Plumose mica in Williamsburg west and northwest of village.

E. Hitchcock: Final Report, p. 701.

1846. **Damourite.** Chesterfield.

Yellow, amorphous; found in very small quantity; gives off water, becomes milk-white. Before the blowpipe melts with great difficulty into white enamel, colorless bead, blue with cobalt. Silica, alumina, with little potash. In recesses in the albite and seems to have undergone strong pressure.

Teschemacher: Proc. Bost. Soc. Nat. Hist., Vol. II, p. 107.

1857. **Mica.** Chesterfield.

The rose-colored mica contains:

K_2O	9.08
Na_2O	.99
Li_2O	.64
H_2Fl	1.89

Angle of optic axes, 74.76.

J. W. Mallet: Am. Jour. Sci., 2d series, Vol. XXIII, p. 180.

1879. **Muscovite pseudomorphs after spodumene.** Chesterfield Hollow. Goshen, Barras farm.

"Many pseudomorphs were found in the Chesterfield vein which consist in large part or entirely of a greenish-yellow muscovite of a peculiar greasy luster. In fact all stages of admixture with cymatolite were observed from the almost pure pseudomorphs of the latter mineral, in which muscovite occurred only in minute or even in microscopical scales, lying mostly parallel to the axis of the crystals—to others in which the mica was so abundant as to have imparted a yellow or greenish color to the mixture and at last to micaceous pseudomorphs, perfectly free from cymatolite. All these varieties of intermixture appear to be rather the results of intercrystallization than of alteration of either one of the pseudomorphous minerals into the other. In another form the pseudomorph in albitic granite graduates into pure muscovite in irregular granular arrangement, producing prisms of great size. At the Barras farm 'aglaite' and muscovite are intercrystallized in similar ways. The change of spodumene into muscovite seems to consist in an exchange of alkalies and removal of $2SiO_2$ from the molecule of spodumene."

A. A. Julien: Spodumene and its alterations; Ann. N. Y. Acad. Sci. Arts, Vol. I, p. 347.

1879. **Killinite.** Chesterfield, Huntington.

"Found frequently, but in limited quantities, at Chesterfield Hollow, and quite rarely in the Huntington vein."

It occupies the entire core of some of the smaller cymatolite pseudomorphs after spodumene, but ordinarily appears as a layer between it and the outer crust of cymatolite (q. v.). Texture foliated; H. = 3.5; luster dull and greasy; color greenish-gray to olive-green. Under the microscope the straight parallel fibers of killinite are continued in the curved needles

1879. **Killinite**—Continued.

and blades of the cymatolite. From the analysis below is deduced the formula for killinite: $H_2K_2Al_2Si_5O_{18} + 2$ aq. which is derived from the doubled molecules of spodumene ($Li_4Al_2Si_8O_{24}$), by the replacement of Li_4 by (H_2K_2), the removal of ($3SiO_2$), and the addition of ($2H_2O$), and this change is assumed to have been caused by "meteoric alteration," by surface waters charged with organic acids and their ammoniacal salts combined with potassa derived from the orthoclase, and to be subsequent to the formation of cymatolite.

SiO_2	46.80
Al_2O_3	32.50
FeO	2.33
MnO	.04
CoO	.04
MgO	.48
CaO	.77
Li_2O	.32
Na_2O	.78
K_2O	7.24
H_2O	7.66
Nitrogenous organic matter	1.14
	100.12

A. A. Julien: Spodumene and its alterations; Ann. N. Y. Acad. Sci. Arts, Vol. I, p. 354.

1880. **Killinite.**

Proved to be probably a hydrous muscovite, or sericite.

G. J. Brush and E. S. Dana: The spodumene of Branchville; Am. Jour. Sci., 3d series, Vol. XX, p. 274.

(In view of the results reached by Brush and Dana in the paper above, we may call attention to the close similarity—chemically—of killinite and muscovite and the greater simplicity of the explanation suggested by Professor Julien (p. 349) for the change of spodumene into muscovite—the separation of ($2SiO_2$) from a molecule of spodumene—as compared with the explanation quoted above for the change of spodumene to killinite.

It is more interesting to see that the two explanations are in essence almost identical, and since the last-quoted explanation is based on an elaborate discussion of a single analysis of a substance which is probably a mixture, I think we are justified in accepting the simpler and extending it somewhat more than the author does to cover the change of spodumene to "killinite" as well as to the coarsely crystalline muscovite.

Killinite is thus the cryptocrystalline representative of the mica pseudomorph as cymatolite is of the granitic.)

1880. **Mica.** Hampden County.

Number of mines	1
Capital	$5,000
Workmen	25
Wages	$750
Explosives	$600
Product, pounds	1,000
Product, value	$1,250

Tenth Census, 1880, Vol. XV, pp. 843, 851, 852.

On page 851 the product is given as 1,000 tons. This refers to the mine of the Pontoosuc flint mills, situated on the mountain south of their mills and in the town of Blandford.

1881. **Muscovite.** Williamsburg.

"Plumose mica abounds on what is known here as Gear Hill, about 1 mile northwest, near the hamlet called Searsville. I have found it plentiful there for some sixty years, and have supposed it the best locality known; found only within the circuit of a few hundred acres."

Morris Dwight (letter to the author).

1882. **Muscovite.** Goshen.

I have found pseudomorphs of muscovite after spodumene on the north shore of Lily Pond, in the northwest of Goshen.

1883. **Muscovite after microcline.** Amherst.

West of middle of long dike east of North Amherst.

Muscovite, white, developed on the cleavages 0, 'P', $\infty P\bar{\infty}$, $\infty P\breve{\infty}$, of nodules of microcline until it nearly takes its place.

1886. **Muscovite.** Monson. Flynt's quarry, east side.

In imperfectly bounded crystals up to 8 inches square; cleavage planes occupied by a twinned network of flattened crystals of magnetite, as in the muscovite of Pennsbury, Pa. The pattern is here finer and more delicate, and there is always a free border one-half inch wide in the muscovite which is free from the magnetite. The crystals occur in the upper edge of a small pegmatite dike which penetrates the gneiss from below and comes to its upper limit in the middle height of the quarry.

1886. **Muscovite.**

The "lithionglimmer" of Chesterfield and other North American localities contains stannic acid.

F. Sandberger: Untersuchungen über Erzgänge, p. 191.

1891. **Muscovite.** Russell.

In columnar crystals.

C. Hinze: Min., p. 629.

NATROLITE.

1818. **Zeolite.** Deerfield.

Rare, radiated.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 114.

1823. **Zeolite.**

Radiated fibrous masses sometimes as large as a musket ball, or, more rarely, an inch in diameter.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 224.

1824. **Fibrous zeolite.** Chester.

Associated with prehnite in fibrous masses (Emmons).

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 45.

1841. **Thomsonite.**

In the amygdaloid on the east side of the greenstone range in Deerfield and Greenfield; a few rather poorly characterized radiated specimens exceedingly resembling the thomsonite of Scotland.

E. Hitchcock: Geol. Mass., p. 662.

1882. **Natrolite.** Deerfield.

This mineral occurs in loose tufts of very minute needles 0.01 to 0.004 mm. in diameter, coating prehnite, especially in those specimens where epidote was abundant. It was not found associated with datolite or any of the succeeding minerals. The needles were colorless when fresh, but large pieces of rock were thickly covered with brown tufts of apparently the same mineral, which gave a black bead with the blowpipe and seemed to be nearly transformed into limonite.

1882. **Natrolite**—Continued.

The natrolite is succeeded in the prehnite-epidote veins only by calcite, acute scalenohedra inclosing whole tufts of the former mineral, and by fluorite, which is speared upon the delicate needles of the natrolite in minute, transparent, colorless octahedra, pierced through a hexahedral axis. From one to four of these are strung upon a single needle, often at the very tip, and in one field of the microscope (× 40) I counted seventeen; and the whole, having as a background the deep-green polished faces of the epidote crystals upon which the group rested, made an object of great beauty. It undergoes also an extremely peculiar alteration into saponite, and further appears in hollow pseudomorphs apparently of saponite—acute prisms resembling epistilbite.

B. K. Emerson: Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXVI, p. 355.

1882. **Natrolite.** South Hadley.

Following up Dry Brook in the northwest of South Hadley to the point where it runs on the line of contact of sandstone on trap, the latter is coarsely amygdaloidal and the cavities are filled with radiated natrolite which make exquisite preparations for the microscope.

1891. **Natrolite.** Buckland, near Shelburne Falls.

In quarry on railroad in white gneiss. Tufts of white needles. Very rare. Associated with axinite.

NEPHRITE (?).

1824. **Jade** (subspecies of nephrite). On Westfield River.

Very tenacious; scratches quartz; of pale-green oily aspect; fragments splintery and fracture dull; rare (Emmons).

C. Dewey: Geol. Berkshire County; Am. Jour. Sci., 1st series, Vol. VIII, p. 43.

(This can not be identified. It is possibly a green hornstone or silicified serpentine from the Middlefield bed.)

OLIGOCLASE.

1865. **Amphodelite.** Chester.

The diaspore is associated with rose-colored amphodelite.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XL, p. 112.

1865. **Indianite.** Chester.

"A vein of indianite many inches thick is found near the tunnel in South Mountain running for many rods through the chloritic rock on the east side of the emery vein (exterior to its gneissoid wall). This chloritic seam is called by the workmen 'the fringe rock.' Small particles of the corundum are diffused through the indianite."

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XL, p. 123.

1866. **Andesine.** Chester.

The rock originally mistaken by me for granular quartz and called indianite by Shepard proves on analysis to be andesine, although it is harder than stated in the books, scratching quartz easily. It is associated with crystals of black tourmaline; compact, fine granular. Sp. gr. 2.586; H. 7.5; color slightly greenish-white.

1866. **Andesine**—Continued.

Analysis.

	No. 1.	No. 2.
SiO_2	62.00	60.00
Al_2O_3	24.40	25.00
CaO	3.50	.....
MgO	.70	.....
Na_2O	8.07	.....
H_2O	1.00	.....
	99.67	.....

C. T. Jackson: Analysis of seven minerals from the emery mine of Chester; Am. Jour. Sci., 2d series, Vol. XLII, p. 107.

1868. **Indianite.** Chester.

Exterior to the vein on its eastern side, a few feet within the talcose slate on South Mountain, near Deerfield River, is a layer 6 inches to 2 feet thick called locally "the fringe rock." Through the middle runs a vein of indianite 2 to 10 inches; massive, fine granular, yellowish; contains corundum.

C. U. Shepard: Report of the Chester emery mine.

The mineral shows all the optical properties of oligoclase.

1887. **Oligoclase.** Palmer; bowlder at house of R. Printible.

In bowlders of coarse hornblende biotite gneiss; large masses 1 to 2 dm. across of a curious very fresh feldspar; color shading from white to pitch black, in large patches. Marked conchoidal fracture and glassy luster, and tabular parting rudely parallel to a prism face. Rarely a brilliant basal cleavage without pearly luster and with fine twin striation; color due to parallel microscopic needles exactly like those in labradorite; sp. gr. 2.63; extinction, 2° 48′ on 0 P. Traces of play of colors on ∞ P ∞.

Analysis by G. H. Corey, class of 1888, Amherst College:

SiO_2	64.74
Al_2O_3	22.48
CaO	4.54
Na_2O	7.84
K_2O	.26
	99.86

This equals 6 Ab : 1 An.

OPAL.

1821. **Stalactitical quartz.** Cummington.

J. Porter: Am. Jour. Sci., 1st series, Vol. VI, p. 247.

1821. **Opal, Hyalite.** Middlefield, Worthington.

Dirty-brown.

Robinson's Cat., pp. 59–78.

1823. **Opal.** Middlefield (Emmons).

J. Porter: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VI, p. 248.

1824. **Siliceous sinter, hyalite.**

In serpentine in Middlefield (Emmons); sometimes nearly stalactitical (Porter); dirty-brown, coarse, ferruginous in Middlefield; reddish-brown with whitish spots (Emmons).

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 39.

1841. **Hydrate of silica.** Pelham.

E. Hitchcock: Geol. Mass., p. 99.

1876. **Opalite.** Variety of *hyalin.* Monson and Greenfield.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 5.

1881. **Hyalite.** Monson, Pelham.

Monson. Delicate chrysocolla green to colorless layers on gneiss and hornblendic gneiss at Flynt's quarry.

Pelham. In colorless layers, botryoidal, on gneiss in quarry above bridge over Amethyst Brook.

1882. **Hyalite.** Greenfield.

A colorless hyalite of fine botryoidal structure covers, with a thick layer, broad surfaces in the dark-gray diabase from the cuttings for the new road from Greenfield to Turners Falls, where also pearly white botryoidal layers are very abundant and seem in many cases to be of very recent origin, and to have coated minute rootlets, which had penetrated the fissures and lay across the botryoidal surface.

B. K. Emerson: Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 355.

1883. **Opal.**

Large bowlders in Amherst, probably from Conway, highly ferruginous and full of small balls of limonite and show drusy chalcedonic surfaces.

Heated thirty hours with 20 per cent solution of KHO, only 46.61 per cent remained insoluble; loss by ignition, 2.94. The citations of the Conway locality are given under Quartz.

1883. **Hyalite after barite.** Leverett, eastern lead mine.

E. J. Whitaker, class of 1883, Amherst College.

ORTHOCLASE.

1820. **Adularia.** Brimfield.

In gneiss and granite. Nearly equal to that of the Alps. Near residence of the late Gen. William Eaton.

Am. Jour. Sci., Vol. V, p. 41; also Amos Eaton, Index, p. 94.

1832. **Adularia.** Brimfield, near center of town.

Greenish; used as a gem.

E. Hitchcock: Geol. Mass.; Am. Jour. Sci., 1st series, Vol. XXII, p. 50.

1838. **Adularia.** Brimfield, one-half mile northeast of village, Warren road, near house of Samuel Patrick.

With iolite; chatoyant; striated.

J. W. Foster: Am. Jour. Sci., 1st series, Vol. XXXIII, p. 399.

1883. **Adularia.** West Northfield.

In minute simple crystals ∞ P, 0 P, 2 $\breve{\infty}$, in drusy surfaces and in larger crystals up to 8 mm., deeply corroded on prism face parallel to the vertical axis, associated with radiated cleavelandite. On Devonian quartzose mica-schist at end of clearing, southwest of South Vernon.

1887. **Orthoclase** var. moonstone. Brimfield, Monson, east part; Wales, Holland.

The fresh transparent feldspar cited above as adularia agrees exactly with the moonstone of Ceylon. It occurs in small lenticular inclosures in the Brimfield schist. Quite large cleavage pieces can be obtained which are wholly free from fissures, and with fine opaline luster. The extinction on 0 P is 0.

1895. **Orthoclase.** Var. **Chesterlite.** Warwick.

Small flesh-colored crystals, ¼ mm. across, in druses in the epidote-garnet rock. South of the village. ∞P, 0 P, P ∞̄.

OTTRELITE.

See Chloritoid (1865) and Biotite (1852).

PELHAMINE.

See Chrysolite (1876).

PELHAMITE.

See Chrysolite (1876) and Jefferisite (1875).

Pelhamite of Cooke 1875 (=jefferisite) antedates pelhamine of Shepard 1876, which is the least altered form of an eruptive rock. Both words should be retired to the list of synonyms.

PETALITE (?) or SCAPOLITE.

1841. **Petalite (?) or scapolite.** Westfield.

In serpentine in a vein nearly a foot wide.

E. Hitchcock: Geol. Mass., p. 618.

(Probably refers to the enstatite bed at Munn's Brook. See p. 77.)

PHENAKITE.

See Beryl, 1838.

PHLOGOPITE.

1885. **Phlogopite.** Middlefield.

In the pre-Cambrian limestone in the railroad cutting on Coles Brook, in small yellow and bronzy scales.

PHOSGENITE.

See Anglesite.

PHYLLITE.

See Biotite.

PIHLITE.

1868. **Pihlite.**

See Cymatolite (1868).

PIMELITE.

1825. **Pimelite.** Middlefield.

"In the neighborhood of the spot where the crystallized steatite is found Dr. Emmons and myself discovered very beautiful pimelite. It occurs in serpentine. It possesses a very deep apple-green color, is very pliable, and when first broken from a cavity is greasy to the touch."

C. U. Shepard: Bost. Jour. Phil. and Arts, Vol. III, p. 609.

(This is not again cited by Professor Shepard.)

1826. **Pimelite.** (Nickel coloring clay.) Middlefield.

Small quantities in cavities in stalactitical quartz; color fine grass-green. The masses when first broken present a granular structure; when dry, become compact and full of cracks and fissures; in quartz connected with serpentine.

E. Emmons: Min. Not.; Am. Jour. Sci., 1st series, Vol. X, p. 11.

The two citations are interesting as showing that the localities of "stalactitical quartz," (that is, the yellow chalcedony of Chester) and the "crystallized steatite" (that is, the olivine pseudomorph in serpentine) are near together, probably in the brook bed crossing the serpentine near its base.

PINITE.

1825. **Pinite.** Chester.

Generally amorphous; in granite traversing mica-slate, one large crystal obtained measuring 2½ inches in diameter; not abundant.

E. Emmons: Min. Loc.; Am. Jour. Sci., 1st series, Vol. X, p. 11.

1841. **Pinite.** Chester (Emmons's Mineralogy).

E. Hitchcock: Geol. Mass., p. 605.

PLATINUM?

1838. **Platinum?**

Dr. H. Holland thought he obtained a trace of platinum from Chester chromite.

E. Hitchcock: Econ. Geol., p. 125.

PREHNITE.

1818. **Prehnite.** Deerfield.

In greenstone, incrusting the columns in radiated masses, rarely crystallized; veins nearly perpendicular.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 114.

1823. **Prehnite.** Deerfield, Greenfield, etc.

In Deerfield radiated masses sometimes contain pyritous copper which occurs also on pseudomorphous quartz, and has evidently been formed since the decomposition of the crystals originally occupying the cavities; also on chalcedony.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 223.

1824. **Prehnite.** West Springfield.

In secondary greenstone, in radiated masses.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 45.

1825. **Prehnite.** West Springfield.

In greenstone; in green radiating fibers, decaying; poor.

Emerson Davis: Min. Not.; ibid., Vol. IX, p. 252.

1825. **Prehnite.** Greenfield.

In greenstone (Hall).

Robinson's Cat., p. 52.

1835. **Prehnite.** Turners Falls, on Greenfield side.

Nearly white; more common on eastern side of greenstone ridges. Example: Mouth of Deerfield River and 4 to 5 miles south at Pine Nook in Deerfield; in West Springfield no very rich specimens.

E. Hitchcock: Geol. Mass., p. 434.

1841. Prehnite. Belchertown, in gneiss; Three Rivers.

E. Hitchcock: Final Report, p. 639.

(Should be Palmer.)

1841. Prehnite. Greenfield, West Springfield.

Common in amygdaloid; color nearly white; more common on eastern side of ridge than western. Examples: Notch of Deerfield River, on east side of same ridge, 4 to 5 miles south at Pine Nook; also West Springfield on west side of ridge; also 1 mile east of Deerfield church, and 1 mile east of Greenfield. Finest specimens at cutting of Western Railroad in West Springfield. The balls of radiated prehnite here occupy veins in the rock along with calcareous spar, which often invests the prehnite with minute crystals. (This last locality is the Tatham cut in the posterior trap. Specimens preserved in the State collection at Amherst.)

E. Hitchcock: Geol. Mass., p. 661.

1859. Prehnite. Three Rivers, Palmer.

"On gneiss."

E. Hitchcock; ibid., p. liv.

(Nearly perfect discs with slightly bulging faces and milled edges like a thick coin. Specimen in the State collection at Amherst.)

1859. Prehnite. West Springfield.

"On greenstone."

E. Hitchcock: Cat. State Col., Agr. Rep. Mass., app., p. lvii.

1882. Prehnite. Pelham.

Ward's quarry on joint in Pelham gneiss. In minute, flat, blade-like crystals 0 P, ∞ P, ∞ P ∞, pale mountain green, often slightly covered with rust layer; in stout crystals 5 mm. to 6 mm. long with same faces or only 0 P, ∞ P; ∞ P is curved and 0 slightly rounded; same color. The latter form is in single crystals and not twinned as in the trap prehnite from Deerfield, as it polarizes simply. Paragenesis:

Gneiss,
Quartz,
Epidote,
Prehnite,
Scolecite,
Pyrite,
Kaolin,
Limonite.

Found by H. A. Smith and others of class of '83, Amherst College.

1882. Prehnite. Deerfield. At Cheapside, south of the river.

In fissures.

Prehnite occurs here most abundantly and always as the oldest mineral in the veins in which it appears. That the veins where it is absent have been filled at a later period and at a lower temperature is evident from the fact that in these the vein walls are quite as fresh as the body of the rock, while in the prehnite veins the walls are deeply decomposed, often to a depth of several centimeters into a rusty vesicular mass, which has been filled with massive prehnite, forming a rock nearly as compact as the trap itself. Similarly many detached fragments of the trap have been thoroughly decomposed and in the same way filled with massive prehnite. Under the microscope the mineral is here seen to be made up of fibers variously matted and interlaced and intermingled with the remains of the trap, and much of it exactly resembles chlorastrolite. In other specimens the oldest layer of the mineral is jet-black to deep oil green, polished and

1882. **Prehnite**—Continued.

often slickensided and gashed, the color being due to the thorough impregnation of the prehnite with diabantite. The motion of the rock walls has also at times broken up the prehnite into sheets, which are slipped over each other variously and recemented by prehnite. Wherever the mineral is hindered in its growth it shows a strong tendency to take on these fibrous forms, which seem to me to depend upon a greater energy of the crystallizing force in the direction of the long horizontal axis; upon which depends also the curvature of the faces so common in the species. Generally these fibers are quite large, peculiarly rigid, and in large numbers parallel to each other. In one slickensided piece the fibers of black prehnite, all straight and parallel and placed at a slight angle to the surface of the trap, seem as if combed into this position by the movement of the walls, and, being jet-black from inclosed diabantite, resemble in appearance seams of fibrous hornblende or chrysotile.

The fibers are, however, generally colorless, transparent, and of a high satiny luster on the face 0 P. They are apparently always elongated in the direction of the long horizontal axis and bounded by the planes 0 P, ∞ P $\breve{\infty}$, ∞ P $\breve{\infty}$. At times the satiny luster is reflected from a large group of the needles at once, and they are seen when magnified to be in juxtaposition, and forming each group for itself an aggregate crystal, the lines of junction being represented in the larger crystals by the striation parallel to the long axis. At times the little groups ran under each other, or joined at their ends under angles of 80° and 100°, as if there were some trace of twinning on ∞ P, as in the spindle-shaped crystals described later. It seemed like a model of the complex striation seen in the latter.

The prehnite also occurs in many drusy cavities covered with small distinct crystals, pale green, emerald green to yellow, and in delicate emerald-green "roses" produced by the multiple twinning of the same form 0 P, ∞ P $\breve{\infty}$, ∞ P $\breve{\infty}$, and in stout, square prisms with base and two sides convex, the two remaining sides concave. The more common botryoidal forms are scarcely represented.

By far the most abundant, finely crystallized, and peculiar form is a stout double cone or spindle, the two cones joining directly base to base with an angle of 80°, or separated by a cylindrical plane, which may become as wide as the conical faces by which it is bounded; rarely this face is replaced by a reëntrant angle of 41°. These three faces are physically unlike, the two sloping ones being sometimes smooth and polished, at others mosaic-like, the equatorial plane being oftentimes milled as regularly as a coin by the oscillatory repetition of ∞ P and ∞ P $\breve{\infty}$, and finally the conical faces become rarely convex in the direction from the apex to the base, producing small, globular forms. These cones are laid usually with their axes parallel to the surface on which they rest—the axes pointing in all directions in this plane—and fused together so that only a fraction of each one is distinct, though they often stand out so that half or three-quarters of the circumference is visible, and in this way completely cover broad surfaces with a splendid crystallization. In color they range from white and nearly pellucid to pale celandine green, and rarely to pale rose color, in the smaller spindles with polished sides, to deep, clear apple green in the largest cones; and in other forms with very broad cylindrical faces, deep mountain green. Several pieces a foot square were obtained covered with the finest crystals. In a single instance the crystals of this form have spread over calcite, and, this having been removed, they presented a group of scarcely adhering individuals, the segments of cones bounded below by a single saddle-shaped face.

1882. Prehnite—Continued.

The internal structure of these crystals is quite peculiar. The pearly basal cleavage passes inward in the direction of a vertical section of the cone, and plates cut in this direction and continued down into the trap show the fibrous prehnite at the base felted together with much decomposed trap, above growing purer and forming distinct crystals with doubly striated cleavage faces, which are twinned along a distinct suture and bounded outwardly by irregular planes of contact. After each crystal has risen above the general level to form the segment of a double cone, the suture forks with an angle of about 41°, and the two lines run to meet the angles formed by the meeting of the two conical faces with the central zone. Each of the spindles is thus made up of three crystals, one on either side of and one within the angle of the Y-shaped suture.

The shaded portion of fig. 2 represents such a vertical section, in which $D\,o'$ and $D\,o''$ ($=\infty$ P $\breve{\infty}$) are the sections of the two conical faces and $o'\,o''$ ($=\infty$ P $\breve{\infty}$) that of the central cylindrical face.

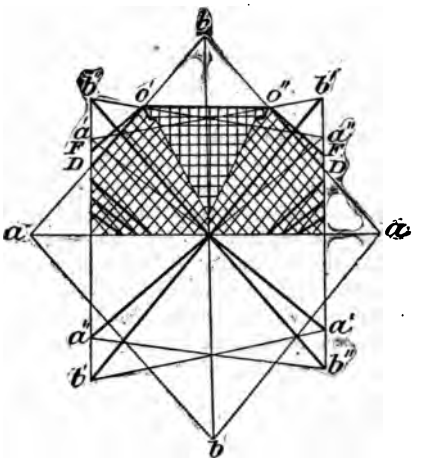

FIG. 2.—Prehnite; cross-section of twins.

The relations of the three crystals are made clear by fig. 2. Three superimposed prisms, ∞ P, having the base 0 P in common are revolved on the common vertical axis c to right and left until a prism face of each becomes parallel to the long horizontal axis of the third. Thus the two lateral crystals form an arrow-headed twin with a face of ∞P in common, and are twinned against the middle one so that the same face ∞P in each is parallel with ∞P $\breve{\infty}$ of the latter. If now the obtuse angle of the two lateral forms be truncated by ∞P $\breve{\infty}$ and that of the central one by ∞P $\breve{\infty}$ down to their point of contact o' and o'', a plane, marked with a heavier line in the figure, results, by whose revolution on the short axis a-a the spindle-shaped twin would be formed. The central crystal has the form of a triangular belt fitted into a similar groove upon the circumference of a wheel. An inspection of the figure will show that the arrow-headed twin, if formed by the union of two crystals having only the faces ∞P and ∞P $\breve{\infty}$, would leave for the third crystal only an extremely shallow reëntrant angle of 160°, whereas the latter penetrates between the two in an angle of about 41°. This is because the acute angles of the lateral crystals are each replaced by the form ∞ P $\frac{3}{2}$, giving a reëntrant angle of 43° 17′. The

1882. **Prehnite**—Continued.

approximated faces of this form are alone strongly developed and make a trumpet-shaped cavity for the reception of the wedge. The curved basal face in the free crystals mentioned above were formed by the blunt point of the arrowhead and by the corresponding faces of ∞ P 3̆ on the outer acute angles below at *a''* and *a'*. The tendency of the mineral to form these strange triplets seems to depend upon the greater intensity of the crystallizing force in the direction of the long horizontal axis, so that of the many crystals which start in the fibrous base only a few survive and grow up into the free space by preponderating additions to the face ∞ P ∞ at right angles to the long axis, and are soon twinned so as to allow a third crystal to wedge in between them and grow by the development of the same face. All three grow thus predominantly in the same direction and expose and add to only the single crystalline face, and the crystal expands in growing like the top of a growing tree. The common vertical axis of the three crystals is bent thus into a circle.

When examined under the polarizing microscope, the central crystal, though showing a strong vertical and a faint horizontal striation, acts as a single crystal. The two flanking crystals present through a whole revolution under the nicols a complex latticework of brilliant colors with two predominant positions of maximum extinction, or rather of extinction of the greatest number of the narrow bands and wedges of color in the field, at angles of 40° and 50° on either side of the suture—that is, when parallel to the two sets of axes *a'* b' and *a''* *b''* of the two lateral crystals. The narrow wedges of color often repeated many times, placed parallel to each other, extinguishing the light together, and bounded by lines making an angle of 10° with each other, are especially peculiar.

Of course the extinction of the light on the right hand of the suture parallel to the axis *b'* can alone be referred to the right-hand crystal, and the extinction at an angle of 10° with this and on the same side of the suture—that is, parallel to the axis *a''* of the left-hand crystal—must be referred to this latter. So that the twin is not formed simply by the approximation of the two parts along the common suture plane, but by the interpenetration also of each by the other in narrow and, as it were, interwoven bands, as is represented schematically in the figure—much more regularly, of course, than in nature.

The two principal striations in each of the lateral prisms make an angle of 40° with the central suture—that is, an angle of 80° with each other.

It follows, taking the prism on the right (fig. 2) for example, that while one of these striations is parallel to the long axis *b'* of this prism, the other is parallel to the long axis *b''* of the opposite, and in fact both striations seem in the plainest manner to be continuous as right lines across the suture.

Traces exist also, very faint indeed, of two other sets of striations at right angles, respectively, to those already described, which are identical with the delicate horizontal lining of the central crystal, and which combined with those first mentioned produce the long wedge-shaped blades with angle of 10° described above. This second striation is indicated in the lower portion of the shading in fig. 2. The phenomena here detailed would seem also to find their explanation in the interpenetration of the lateral prisms.

The similar twins of prehnite from Farmington, Conn., which occur in the same Triassic trap as the Deerfield crystals, were figured by M. Des Cloizeaux,[1] and have been recently the subject of discussion by the

[1] Min., p. 451, Atlas XXIX, 167 bis, 1862.

1882. **Prehnite**—Continued.

same author[1] and by M. Mallard[2] because of their optical peculiarities. They do not seem from the descriptions to present the spindle shape, and in cross section they differ from the Deerfield crystals in one important particular.

In the Farmington crystals the sloping faces (*F* in fig. 2) make an angle of 100° with each other, and the termination of the crystal is thus bounded by a threefold repetition of the face ∞ P $\breve{\infty}$, while in the Deerfield forms the corresponding angle of the two sloping faces measured over the single exposed face of the central crystal is 80° (*DbD*, fig. 2), and the three faces have the formulæ ∞ P $\bar{\infty}$, ∞ P $\breve{\infty}$, ∞ P $\bar{\infty}$.

One may express the relation of the two very simply by saying that in the Farmington crystals the end of the arrowheaded angle twin having the reëntrant angle has its acute angles truncated by ∞ P $\breve{\infty}$ to form the sloping sides, while in the Deerfield forms the other end is developed, and the outer obtuse angles truncated by ∞ P $\bar{\infty}$, as in the annexed figure.

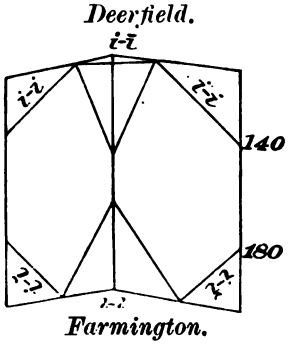

FIG. 3.—Prehnite; cross-section of twins: from fissures in Trassic diabase at Cheapside, Deerfield.

It seems to me simpler to say that the interpenetration of the two is so complex and at the same time so varying that in one case on the right of the suture the crystal which is turned to the right predominates and is truncated by ∞ P $\breve{\infty}$ (*F* in fig. 2), at right angles to *b'*, and in the other that which is turned to the left predominates on the same (the right) side, and determines the truncation by ∞ P $\bar{\infty}$ (*D* in fig. 2) at right angles to axis *a''*; while in the forms curved in the direction *o' a*, and in those with faceted faces, there is a gradual or interrupted transition from one to the other.

This would also harmonize very well with the complex optical results detailed in the above papers, and especially with the dispersion tournante signalized by M. Des Cloizeaux for the Farmington crystals.

If the sloping faces in the Deerfield crystals, like those of Farmington, be referred to the acute angles of the arrowhead, to recur to the first explanation given above, they would have the more complex formula ∞ P $\bar{6}\frac{3}{4}$. Furthermore, the two well-marked striations described above form by their intersections diamonds with the acute angles (80°) at top and bottom, while the larger angle is at the sides, while the drawing of M. Des Cloizeaux[3] shows the reverse to be the case in the crystals from Farmington.

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[1] Bull. Soc. Min., Vol. V, Nos. 2 and 5, 1882.
[2] Ibid., No. 3.
[3] Min.; ibid., loc. cit.

1882. **Prehnite**—Continued.

That is, in the first they are parallel to b' and b'' (fig. 2), while in the second case, if they were exactly the reverse, they would be parallel to the short axes a' and a''; but they are stated in the later article of M. Des Cloizeaux to make an angle not of 80°, but of 82°, with each other, so that while one is parallel to a short axis the other is parallel to a hypothetical face, ∞ P 6. If they made an angle of exactly 80° with each other, they would represent the horizontal striation of the central crystal and the faint second striation described in the Deerfield crystals, as slightly indicated at the bottom of fig. 2. As it is, they are difficult of explanation.

In amygdaloid cavities.—The amygdules of the trap quite closely repeat in miniature the occurrence of the large fissures, but the peculiar changes the prehnite undergoes in the former case makes it needful to discuss separately its modes of appearance there.

In the coarse diabase it occurs compact, of a bright green, as if colored by copper. The paragenesis is (1) diabantite; (2) chalcopyrite, pyrite, galena, prehnite, one or all; (3) calcite.

In the red diabase so abundant in the upper part of the dike through Greenfield and Gill it appears in spherical and spheroidal balls 12 to 15 mm. in diameter, very fine fibrous, and satiny, and very pale green to colorless; coated, and for a distance is impregnated with diabantite. It is radiated, fine fibrous, the fibers not easily separated, and diverging from several centers and meeting along sharp suture lines, so that only parts of spheres result, and if waterworn the grains would form perfect chlorastrolites.

In the dark-gray diabase from the north side of the Deerfield, and on through Greenfield and Gill, cavities 10 to 35 mm. across are sometimes filled with fibrous prehnite, the whole blackened as if it had been held in the flame of a candle. Under the microscope the fibers are, for the most part, perfectly fresh, and up through the spaces between them has penetrated a black amorphous powder looking like the beard of iron filings on a magnet, or like a network of soot-covered cobwebs. The whole seems to be dendritic in character.

B. K. Emerson: The Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 269.

1882. **Prehnite.** Bernardston.

Small compound crystals made up of several prisms surrounded by a dome and joined so as to make a form like a section of a thick saw blade, at the base of the upper quartzite of the Bernardston series; Williams farm.

1886. **Prehnite.** Northampton; at crossing of the Connecticut River Railroad, south of Mount Tom station.

In diabase; pale green, botryoidal.

1886. **Prehnite.** Northampton. At a quarry near W. N. Moore's, east of Florence.

In granite; a vein 10 mm. thick has on either wall quartz combs; on these broad sheets of finely crystallized prehnite, the crystals simple, 10 mm. long; forms 0 P (001), ∞ P (110), ∞ P $\bar{\infty}$ (100), ∞ P $\breve{\infty}$ (010); often rosetted by continuous twinning around the vertical axis. For paragenesis see monograph on the geology of the area.

1886. **Prehnite.** Prescott.

North part, roadside west of old cemetery, in fissures in diorite.

Pearly white, in drusy surfaces of minute plates like Des Cloizeaux, Pl. XXVIII, p. 165; 0 P (striated parallel to $\infty \bar{P} \infty$), ∞ P, ∞ P $\bar{\infty}$, ∞ P $\breve{\infty}$, 3 P $\breve{\infty}$ P; plane of optical axes ∞ P ∞; divergence 76°, positive; also covering broad surfaces with radiated fibrous circles 8 to 10 mm. in diameter, like wavellite, and in stout, fasciculate groups of crystals of forms like fig. 166 of the above plate, 0 P, ∞ P $\bar{\infty}$, ∞ P $\breve{\infty}$, P (?).

An imperfect analysis made in the chemical laboratory of Amherst College gave results agreeing well with prehnite, except in the water determination. Mr. G. G. Pond, assistant in the laboratory, determined the water with care to 5.24, exactly that of prehnite.

1889. **Prehnite.** Monson.

In a vein in the northwest of Flynt's quarry; drusy surfaces of minute, transparent, colorless blades, 0 P, ∞ P $\breve{\infty}$, ∞ P $\bar{\infty}$, ∞ P, flattened on 0 and elongate parallel to *a*, as determined by fixing the position of the optical axes, associated with epidote, actinolite, and clinochlore, which it follows. It is covered by a transparent calcite and later fine green rosettes and barrel-shaped groups of prehnite with laumontite and calcite, shows the richest green color.

PROCHLORITE.

1823. **Chlorite.** Hawley and Plainfield.

Abundant and extremely beautiful.

J. Porter: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VI, p. 248.

1823. **Chlorite.** Leyden and Conway, foliated. Millers Falls in Montague, penetrating milk-white quartz; New Salem.

E. Hitchcock: Geol. Conn. River; ibid., p. 228.

(The occurrence at Millers Falls is probably in bowlders, as the unaltered Triassic sandstones do not contain chlorite.)

1824. **Chlorite.** Middlefield and Chester.

In small masses; also in mica-slate (Emmons).

C. Dewey: Geol. Berkshire County; Am. Jour Sci., 1st series, Vol. VIII, p. 52.

1825. **Chlorite.** Zoar.

Abundant.

H. W. Wells: Robinson's Cat., p. 78.

1889. **Prochlorite.** Blandford, Whately, Northfield.

Occurs in quartz veins at contact of granite and hornblende schist near Bartholomew's quarry, in Blandford. In quartz veins in the argillite at Whately, and in the Devonian mica-schist in West Northfield. As a constant constituent of the sericite-schist across the whole width of the State. It is here largely derived from garnet.

PYCNITE.

See Topaz.

PYRITE.

1818. **Sulphuret of iron.** Charlemont and Deerfield.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 115.

1823. **Sulphuret of iron.** Hawley.

Small but beautiful crystals.

J. Porter: Min. Loc.; ibid., Vol. VI, p. 248.

1823. **Sulphuret of iron.** (**Pyrites. Iron pyrites.**) Bituminous shale.

Westfield, Sunderland, Plainfield, limpid quartz. Hawley, compact. Montague, with hematite. Southampton lead mine, fine crystals as large as shot; octahedrons truncated in all their angles.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 232.

1841. **Sulphuret of iron.**

In mica-slate. Heath, handsome cubic crystals. Hawley, massive, in considerable quantity near junction of mica and talcose slate. Loudville, small octahedra truncated on angles.

E. Hitchcock: Geol. Mass., pp. 607, 705.

1844. **Iron pyrites.** (*Pyrites cubicus.*) Hawley, Heath.

In handsome crystals.

J. D. Dana: Sys. Min., p. 479.

1884. **Pyrite.** Rowe.

Ore of Davis mine.

Fe, 42.83; S, 50.30; Cu, 3.07; granular.

G. Lunge: Dingl. Polyt. Jour., CCXLIX, p. 48.

1887. **Pyrite.** Heath.

The vein of iron pyrites on the old Chester Rice farm at Heath, now owned by J. W. Tinkham, has been distinctly traced, and is on the surface about 5 feet wide by about 12 feet in length. There is thought to be a rich mineral pocket beneath the indications.

Springfield Republican, 1887.

1891. **Pyrite.** Heath.

A ledge of rock thickly sprinkled with pyrites of iron 3 to 4 feet wide and 12 or more in length has been discovered in a ravine on the Tinkham farm. A small stream runs over the rocks, which when broken with a sledge disclose the pyrites, bright and shining.

Springfield Republican, February 24, 1891.

1891. **Pyrite.** Rowe.

The Davis mine in Rowe has furnished the largest amount of pyrite of any locality in the State, and is perhaps the only profitable mine in the State. The mineral is abundant everywhere in the Hawley schists. An especially fine deposit occurs south of Forge Hill, in Hawley. The deposits are of greater geological than mineralogical interest.

PYROCHLORE.

See Microlite, which was claimed to be pyrochlore.

PYROLUSITE

1824. **Oxide of manganese.** Plainfield.

"Yielding vital air in abundance."

Dr. J. Porter: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VII, p. 252.

1824. **Black oxide of manganese.** Cummington, near Plainfield.

Cummington; compact and earthy. Also two localities of the compact variety of this ore west of Plainfield; in great abundance and of excellent quality.

Same; ibid., Vol. VIII, p. 233.

1824. Black oxide of manganese. Plainfield.

"Dr. Porter, of Plainfield, sent me what he calls iron ore. I have lately ascertained that it is manganese; Cummington or Plainfield."

E. Emmons: Loc. Min.; ibid., Vol. VII, p. 254.

1824. Oxide of manganese. Cummington.

C. Dewey: Geol. Berkshire County; Am. Jour. Sci., 1st series, Vol. VIII, p. 57.

1827. Manganese. Conway.

In quartz vein 2 or 3 miles southeast of the meetinghouse.

A. Nash: Lead mines of Hampshire County; ibid., Vol. XII, p. 255.

1835. Oxide of manganese. Conway.

In a vein of jaspery quartz 6 to 8 feet thick; dip, 90°; strike, north 20° east; in southeast of Conway with hematite.

Same in numerous bowlders in Amherst 1 mile northeast of the college.

E. Hitchcock: Geol. Mass., p. 344.

1841. Oxide of manganese. Plainfield.

One mile west of Center and near southwest corner. Associated with rhodonite; mined for iron. Conway, southeast part; distinct vein in quartz, several feet wide.

E. Hitchcock: Geol. Mass., p. 205.

1841. Pyrolusite. Plainfield.

Several beds occur near one another at two principal places represented on the map; smaller and larger beds occur within a few feet of each other. The beds are rarely more than 3 or 4 feet thick. Apparently common pyrolusite. On breaking open the mass they are found to be of a beautiful rose red—the bisilicate of manganese of Dr. Thomson. Many blocks in wall northeast of the church in Cummington, in talcose slate.

E. Hitchcock: Geol. Mass., p. 612.

(This refers to the black decomposition products of the rhodonite.)

1878. Pyrolusite. Amherst. Bowlders.

Very fine specimens found by J. M. Clarke in yellow jasper, doubtless from Conway.

1879. Pyrolusite.

Films of pyrolusite in cleavage cracks of spodumene derived from decomposition of garnet.

A. A. Julien: Ann. N. Y. Acad. Sci. Arts, Vol. I, p. 319.

1881. Pyrolusite.

Large bowlder; cavernous quartz with pyrolusite found by H. B. Patton, class of 1881, Amherst College, on east end of Holyoke range.

PYROMORPHITE.

1835. Phosphate of lead. Southampton.

Spherical light-green masses.

E. Hitchcock: Geol. Mass., p. 508.

1841. Phosphate of lead. Southampton.

Spherical light-green masses.

Ibid., p. 705.

1879. Pyromorphite. Leverett, south mine.

Pseudomorphs of pyromorphite in small hexagonal prisms ∞ P, 0 P. Thin films of silica containing a pulverulent mixture of limonite and a carbonate.

1885. **Pyromorphite.** Loudville.

The finest specimen I have seen is in the Kunz collection, purchased by Amherst College. It is a large mass of quartz, covered with crystals which rival those from Phœnixville in beauty. The quartz agrees exactly with the Loudville gangue.

1887. **Pyromorphite.** Loudville.

In large, thick coatings and drusy surfaces; also in a fine, brown coating on quartz, and covered by wulfenite. Occurs coating quartz in broad faces; small botryoidal, fine and rare.

In Clark collection of Smith College.

PYROPHYLLITE.

1876. **Pyrophyllite.** Leverett lead mine, North Leverett.

Pale-green, compact layer 1 to 3 mm. thick on dark-gray veinstone, which consists of blue quartz and some clearly cleavable glassy feldspar, with much barite in the mass; gives blue color with cobalt, swells and whitens and fuses with difficulty. H. = 3. Greasy feel, brittle, fibrous in places.

PYROPE.

See Garnet (1823).

PYROPHYSALITE.

See Topaz.

PYROXENE.

1824. **Augite.** Chester and Middlefield.

Abundant in amorphous masses; sahlite and coccolite.

E. Emmons: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VII, p. 255.

1824. **Augite.** Chester.

Greenish-gray, brown, yellowish, tending to crystalline forms; also beautiful white augite finely granular or compact; foliated with considerable luster.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 48.

1825. **Pargasite.** Chester.

Short, green crystals with idocrase and epidote.

E. Emmons: Min. Not.; ibid., Vol. X, p. 11.

1825. **Augite.** Chester.

Abundant in amorphous masses. Sahlite and coccolite in beds in mica-slate well characterized. Found also in Middlefield in above varieties.

Robinson's Cat., pp. 42, 59.

(I have not been able to verify the above citations. The augitic sienite mentioned below is a pyroxene hornblende contact rock upon the granite, and the pyroxene is in broad grass-green blades.)

1835. **Augitic sienite.** North part of Belchertown.

Augite and feldspar, bowlders, in Amherst (Nos. 1362, 1363 in State collection).

E. Hitchcock: Geol. Mass., p. 455.

1835. **Augite.** Pelham.

With feldspar, actinolite, and sphene.

Ibid., p. 398.

1835. **Augite.** Williamsburg.

Augite rock. Granular greenish-yellowish, mixed with quartz interstratified with mica-schist and hornblende-schist, 2 miles west of the meetinghouse. Nos. 226 and 227 in the State collection. Also at Chester (Emmons).

Ibid., p. 330.

Wanting in the State Collection.

1841. **Augitic sienite.**

"The presence of hornblende in this rock and the absence of mica have led me to call it augitic sienite rather than augitic granite, although in position it is associated with granite. There are two varieties: First, black hornblende, greenish augite, and yellowish feldspar; all the ingredients, except the feldspar, exhibiting a very distinct and lively crystalline structure; this variety occurs in the north part of Belchertown. Second, augite and feldspar in bowlders in Amherst, the former being so arranged in the latter as to present the appearance of letters."

E. Hitchcock: Geol. Mass., p. 669.

1876. **Augite.** Belchertown.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College.

1881. **Pyroxene.** Pelham.

Three fine pieces of a light-colored well-crystallized pyroxene in calcite from the asbestos mine, well terminated and complex, were destroyed with the Shepard collection.

Rarely in large, stout, pale-green prisms in Pelham gneiss.

1887. **Augite.**

Occurs as a characteristic constituent of the Triassic diabase, usually microscopic, but at Titan's Pier in black curved plates several millimeters across.

1887. **Diallage.** Hatfield, Belchertown.

Occurs as a characteristic element of the Hatfield and Belchertown tonalite; in the former almost always, in the latter largely, changed to hornblende, so that it is possible that it is the source of all the hornblende; most abundant in large crystalline grains near S. and A. Craft's, Belchertown.

PYRRHOTITE.

1841. **Hepatic sulphuret of iron.** Middlefield.

In bitter spar, in serpentine. In talcose slate.

E. Hitchcock: Geol. Mass., p. 613.

1886. **Pyrrhotite.** Charlemont.

The pyrite occurring in a vein in gneiss is described as made up of pyrrhotite and true pyrite.

A. A. Julien: The decomposition of pyrite; Ann. N. Y. Acad. Sci., Vol. III, p. 398.

1891. **Pyrrhotite.** Chester.

In large, nodular masses at the emery mine. In colorless diaspore with rutile and corundophyllite.

QUARTZ.

1810. **Quartz.** Southampton lead mine.

Numerous crystals, usually very regular, sometimes large, and often so beautiful and brilliant that the cavities look as if studded with gems. Many are sufficiently perfect to deserve a place in the choicest cabinets.

B. Silliman: Bruce's Min. Mag., Vol. I, p. 64.

1818. **Quartz.**

Rock crystal, Conway, on feldspar (description); irised quartz, Leyden; granular quartz, Deerfield; radiated quartz, Whately and Shelburne; blue quartz and greasy quartz, rolled masses on banks of Deerfield River; pseudomorphous quartz, lamellar quartz, tubular or pectinated quartz, in greenstone, Deerfield; geodes and prase, North Sunderland (poor); amethyst, in greenstone, Deerfield; chalcedony, carnelian, cacholong, sardonyx and agate, in greenstone, Deerfield (described); jasper, Deerfield River and Leyden (arrows). Petrosilex (poor), same. Rose quartz, bowlder, Deerfield.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, pp. 112, 113.

1823. **Basanite.** Deerfield.

In alluvial soil on the banks of the Deerfield River, perhaps brought by aborigines.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 220.

1823. **Quartz.**

Blue quartz, Cummington. Rose, beautiful and abundant, east part of Chesterfield. Irised, abundant, Chesterfield. Red, yellow, orange, from film of metallic oxyd, greasy, Plainfield. Arenaceous, Plainfield and Cummington; abundant, burnt and crushed for sand. Stalactitic, at falls of brook in Middlefield. The crystals, which are small and have a light tinge of red, are formed on serpentine, evidently in a manner similar to that of stalactites. The specimens are of singular beauty (Emmons).

J. Porter: Loc. Min.; ibid., p. 247.

1823. **Quartz.**

Fetid, Cummington; chalcedony, Middlefield.

Milky or reddish-white with blood-red spots; cavities lined with minute and beautiful crystals, sometimes blood red, generally white or bluish (Emmons). Hornstone, Middlefield (Emmons). Agate, Chester (Emmons).

J. Porter: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VI, p. 248.

1823. **Quartz.**

Limpid, Plainfield (J. Porter). In lead mines in veins in Southampton and Leverett, and in copper veins in Greenfield, here doubly terminated. In sienite in Northampton. Greenstone, Deerfield, in veins and geodes 1 to 10 inches wide. In mica slate in Conway; crystals one-tenth to 2 inches wide, in vast quantities. In Conway fragments as transparent as quartz from Madagascar. Smoky, Plainfield. Yellow, Southampton lead mine. Honey-yellow, resembling Siberian topaz, rarely at Leverett. Irised, Plainfield (J. Porter). Leyden, in mica slate. Milky, Cummington and Plainfield (J. Porter), poor. Radiated, Southampton, Whately, Leverett (in lead), Conway. Lamellar, greenstone, Deerfield; usually parallel; thin, brittle, sometimes intersecting. Conway, large, loose masses in mica-slate above 1 foot in diameter; plates often drusy, grades with common quartz. Pseudomorphous, cubes, Southampton lead mine. Deerfield in greenstone; also, at Deerfield, cavities with radiated arrangement, flattened, four-sided prisms one-half to 4 inches long (zeolite?).

Amethyst, Mount Tom (Silliman), Deerfield; geodes, light purple, one-tenth to 1 inch.

Chalcedony, Hadley, Sunderland, Deerfield, Gill, and in almost every greenstone hillock and ridge from New Haven to Gill (description).

Chacolong, carnelian, sardonyx, agate, Deerfield; in greenstone with chalcedony.

1823. Quartz—Continued.

Since the publication of previous accounts Dr. Dennis Cooley has discovered a new locality in the Deerfield greenstone, from which he has obtained specimens so much superior to these heretofore found that they deserve particular notice. Six specimens are described. No. 1 is without chalcedony; another, with amethyst, weighs 23 pounds. Others are described as fortification and ribboned agate, and spoken of as of the first quality.

Hornstone, Southampton lead mine; Conway. In greenstone in Deerfield and Sunderland; nodules 4 to 5 inches in gray-green, black, reddish, and dark-blue; fracture little conchoidal and glistening or dull and splintery, nearly opaque; some specimens resemble siliceous slate, others prase. Professors Silliman and Dewey, the latter of whom has examined it chemically, agree in calling it hornstone.

Jasper, Cummington, banks of Westfield River (J. Porter); banks of Deerfield River in Deerfield. Conway, Leyden, rolled, red, black, and yellow.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, pp. 214-219.

1824. Plasma. Pelham.

The most interesting mineral from Pelham is one which is undoubtedly a subspecies of quartz. It strongly resembles chalcedony; it preserves but little luster; its fracture is nearly even, somewhat splintery and flat-conchoidal; it breaks readily under the blow of the hammer into large, indeterminate, sharp-edged fragments, sometimes exhibiting concretions; its color is leek-green, uniformly diffused excepting occasionally small whitish dots which are distributed through the mass at nearly equal distances; it is translucent. Before the blowpipe it loses its color and becomes white. Should it belong to the subspecies chalcedony it is the variety called plasma, which has not been found hitherto in the United States. It was discovered in digging a cellar in a rounded mass upward of 2 feet in diameter.

C. U. Shepard: Min. Loc.; Am. Jour. Sci., 1st series, Vol. VIII, p. 235.

1824. Laminated quartz. Cummington and Plainfield.

Both milky and smoky. Jasper; blue in brook in Worthington.

J. Porter: Loc. Min.; ibid., p. 233.

1824. Quartz. Middlefield.

Minute pyramids in cavities in serpentine (Emmons). Smoky, banks of streams. Rose, Chester, in granite. Irised, rolled masses, beautiful, Middlefield (Emmons). Greasy, Plainfield (Porter). Tabular, Middlefield. Blue, Cummington (Porter); grayish blue, differs little from the smoky.

Laminated; new variety, Chester (Emmons); distinctly laminated, folia separate by a blow like those of calcareous spar; partially translucent; faces not smooth, and marked by oblique striæ.

Amethyst, in trap, West Springfield (Emmons). Ferruginous, fetid, chalcedony, in Middlefield in serpentine.

Hornstone, dark-blue in Middlefield in serpentine (Emmons).

Agate, Middlefield and Chester; ground-yellow jasper with bands of bluish-white; one weighed 200 pounds; it seems one vast agate made up of a multitude of smaller ones.

C. Dewey: Geol. Berkshire County; Am. Jour. Sci., 1st series, Vol. VIII, p. 37.

1824. **Quartz.**

Yellow crystals, Worthington. Fetid, Chesterfield. Chalcedony, Cummington. Jasper, red, banks of the Westfield River in Cummington.

J. Porter: Loc. Min.; ibid., Vol. VII, p. 253.

1824. **Agate.** Near Chester.

"Weight upward of 180 pounds; yellow jasper and chalcedony—a large mass of chalcedony and jasper which is in part agatized. I have since seen not far from the village a mass almost twice as large as the one mentioned above." (Came from the serpentine.)

E. Emmons: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VII, p. 256.

1825. **Quartz.**

Plainfield, blue, good color. Shelburne, radiated.

J. Porter: Loc. Min.; ibid., Vol. IX, p. 54.

1825. **Quartz** (after calcite). Williamsburg.

"This mineral has the form of hogtooth spar incrusted with very minute crystals of quartz, but on breaking it it is found to be hollow with larger crystals at its base, or in some few instances it is wholly filled up with semicrystalline quartz."

Hampshire Gazette, July 14, 1824. Quoted by J. Porter in Min. Not.; ibid., Vol. IX, p. 54.

1825. **Quartz.** Chesterfield.

Crystallized in the form of the primary rhombohedron in feldspar; dull, one-fourth inch long, lateral edges usually truncated.

C. U. Shepard: Bost. Jour. Phil. and Arts, Vol. III, p. 608.

1825. **Quartz.**

Amethyst, Mount Tom; beautiful crystals. West Springfield (see Am. Jour. Sci., 1st series, Vol. VIII, p. 38.) Flint, in bituminous shale of coal formation. Blue jasper, Worthington, margin of brook (J. Porter). Chalcedony, Amherst; in rolled masses, of fine blue color in a brook.

Robinson's Cat., pp. 35, 65, 74, 78.

The latter was in bowlders from Conway.

1825. **Amethyst.** Belchertown.

In a rounded mass about 18 inches in diameter, composed of imperfect prismatic crystals of extraordinary size which shoot out from a quartzy gangue containing galena, blende, and copper pyrites. Many of these crystals terminate in regular pyramids at the surface, but just previous to their termination the amethyst passes through them in a vein from 1 to 2 inches in width, and below the vein are zigzag striæ of milky quartz, which render many of the crystals very beautiful.

C. U. Shepard: Loc. Min.; Am. Jour. Sci., 1st series, Vol. IX, p. 47.

(Specimens in cabinet of Amherst College.)

1825. **Quartz.**

Announces the discovery of a new mass much larger than the one first found of the Pelham prase. (Plasma, above, 1824.) It is more uniformly colored, does not have whitish and yellowish spots distributed through it, and is of a deeper color; in a single place it passes into common quartz. "I think there is no doubt of its being the hornstein eccailleux of Brochant."

C. U. Shepard: Loc. Min.; ibid., p. 47.

1825. **Quartz** (after fluor). Westhampton.

"The quartz is formed in the vicinity of the argentite; some of these projections are rectangular; perhaps these were formed upon crystals of

1825. **Quartz** (after fluor)—Continued.

sulphuret of lead, as some lead is found in the rock. We have found but a few of the cubic projections. The dogtooth formation is found in abundance." (The cubes show the twinning of fluor.)

Letter of Mr. Morris Dwight; Am. Jour. Sci., 1st series, Vol. IX, p. 176.

1825. **Quartz** (after calcite). Loudville mine.

Hexahedral prisms with trihedral summits grouped in cavities in quartz, one-half inch in diameter; brownish-yellow, drusy.

C. U. Shepard: Min. Loc.; ibid., Vol. IX, p. 249.

1825. **Amethyst** (in greenstone). West Springfield.

Emerson Davis: Min. Not.; ibid., p. 252.

1826. **Tabular quartz.** Palmer.

Of a wine-yellow color, found in abundance in Palmer at the site preparing for the new factory at Three Rivers. The crystals may be obtained in large groups, well defined, and embedded in coarse granite.

Anon: Chem. and Min. Jour., Vol. I, p. 78.

1826. **Quartz.**

Stalactitical, Middlefield, Cummington, Worthington. Radiated quartz, covered with crystals, Goshen and Williamsburg. Blue jasper, in branch of Westfield River, Chester.

J. Porter: Min. Not.; Am. Jour. Sci., 1st series, Vol. X, p. 18.

1835. **Quartz.**

Amethyst. One mile east of Deerfield, 3 miles south and east of Bloody Brook. Mount Holyoke and West Springfield—here smoky. Tabular, 1 mile east of Deerfield. Chalcedony, gray and yellow, east of Deerfield, and Greenfield on west side; rare on east side of the mountain. Agates usually small; those found by Dr. Cooley, 2 miles northeast from Bloody Brook meetinghouse (South Deerfield), 9 by 6 inches; weight, 23 pounds; outside green one-half inch, then flesh colored, then amethystine (No. 1191). Fortification agate. Chalcedony is also found in the Middlefield serpentine, and it sometimes passes into hornstone. Large rolled masses of these minerals, often agatized, have been found in Middlefield and Chester, which probably proceeded from some serpentine locality. Also in the same, serpentine drusy quartz of extreme beauty.

Pelham. In bowlders scattered over several acres; fine crystals, limpid, commonly light-brown to fine topaz-yellow, rarely amethystine, 2 inches in diameter; with this, fine chalcedony milk-white to delicate olive.

E. Hitchcock: Geol. Mass., pp. 371, 399, 435.

1841. **Quartz.**

Nearly all the preceding localities cited; also Whately; delicate crystals in sienite, druses with blade-like cavities from removal of crystals (barite). Pelham, south part; crystals in large quantity, some of which will answer for the lapidary; hornstone (Shay's flint), mass presented by O. M. Clapp to E. Hitchcock. Goshen, crystals of smoky quartz. Blandford, Chester, Chesterfield, Williamsburg, rose quartz. Southampton, Westhampton, pseudomorphs after calcite and fluor. Mount Holyoke, amethyst; also Amherst, in rolled masses. Conway, southeast part, vein 6 to 8 feet of brown and yellow jasper and black, brown, white, red, and yellow chalcedony, rarely banded agate; whole often brecciated; with hematite and pyrolusite; same abundant in bowlders in Amherst.

E. Hitchcock: Geol. Mass., pp. 186, 604, 700.

1844. **Quartz.** (*Hyalus rhombohedrus*). Pelham and Chesterfield.

Yellow jasper. Chester.

J. D. Dana: Sys. Min., p. 412.

1859. **Crystallized quartz.** Norwich. Angell's mine.

E. Hitchcock: Cat. State Geol. Cab.; Rep. Agri. Mass., Vol. VI, App. LXIX.

An examination of these specimens which are contained in the collection deposited at Amherst College shows that they are beautiful pseudomorphs after calcite—$\frac{1}{2}$ R, and that the broad, flat plates from 1 to 3 inches square and of drusy surface are pseudomorphs after barite.

1876. **Quartzite.**

Name proposed in place of quartz.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst, p. 6.

1879. **Quartz.** Chesterfield Hollow.

Pseudomorph after spodumene, very rare, 6 to 9 inches long, sharply defined, not terminated.

A. A. Julien: Spodumene and its alterations; Ann. N. Y. Acad. Sci. Arts, Vol. I, p. 350.

1882. **Hornstone.**

In abundant half-inch veins in a layer of decomposed gneiss with laumonite, north end of Monson quarry; leek-green.

1882. **Quartz.** Deerfield.

Only in a single specimen from the Cheapside veins did quartz appear associated with the zeolitic minerals. Here a few minute, elongated prisms appear in and on prehnite. Toward the upper surface of the dike occur veins 4 to 5 cm. wide—coarse, comby quartz, whose terminations interlace irregularly at the center. Between the wall on one side and the regular cockscomb quartz, a layer 10 mm. thick of broken-up quartz crystals, recemented by quartz, showing that the vein had once partly filled itself and then by the rubbing together of the walls the work was interrupted. In other parts of the vein the quartz is much gashed by broad, thin cavities, which are often as many as twelve, one above the other, and parallel to the walls as well as scattered in various directions. They seem to have been produced by the repeated formation of a layer of some mineral, now wholly gone, probably selenite or barite.

B. K. Emerson: The Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 351.

1883. **Yellow jasper.**

Bowlder in North Amherst, but doubtless from the vein in Conway (see 1841, above). Filled with spherical globules of hematite just visible with lens. Analysis by Mr. Wm. Orr, jr., class of 1883, Amherst College. Heated twenty-four hours on sand bath with KHO. Sp. gr. 1.20.

Analysis.

SiO_2 (soluble)	55.59
SiO_2 (insoluble)	26.34
Fe_2O_3	15.77
Mn_2O_3	.62
	100.87

1885. **Quartz.**

In quite large crystals and fine drusy crystallizations, colorless and amethystine, rarely showing only tetrahedral faces. In many cases filled with minute (1 mm.) globules of hematite so orientated that over a broad surface all the crystals are filled on one side and looking from the opposite direction the globules are all invisible. In diabase south of Titans Piazza.

1885. **Chalcedony.** Chester.

Thick masses of amber color, fine botryoidal with stalactitic forms and incrustations of rootlets from the serpentine.

1885. **Agate.** Granby.

Veins 20 to 25 mm. thick of a fine, bluish-white agate occur in the fourth volcanic core east of the road running south from the Notch.

1894. **Quartz.** Warwick.

At the epidote locality at Crystal Hill, north of Hastings Pond, fissures in the epidote garnet rock are filled with long slender quartz crystal 5 to 6 cm. long, which project freely into the cavity, are transparent, and perfectly terminated with one terminal face predominant, as in the Dauphinée crystals.

1895. **Quartz.** (Pseudomorph after galena.) Southampton lead mine.

Hollow cubes, often a half inch across, often with parallel ridges on the inside, when the quartz penetrated into the cubical cleavage planes of the galena.

QUINCITE.

See Montmorillonite (1876).

RHODOCHROSITE.

1825. **Carbonate of manganese.** Cummington.

Flesh-color and rose-red, outside gray to black; recent fracture soon changes to dark color if exposed to moisture.

Effervesces sharply with acid in powder; NO_5 dissolves it entirely; before blowpipe browns; infusible. In large amorphous mass in many places in Cummington; has been called red oxide of manganese; by others siliceous oxide of manganese and gray oxide of manganese. All the specimens I have examined effervesce in acid.

E. Emmons: Am. Jour. Sci., 1st series, Vol. IX, p. 249.

1852. **Diallogite.**

A pulverulent pink variety coating triplite in granite; occurs at Goshen and Norwich.

C. U. Shepard: Min., 3d ed., p. 96.

1891. **Rhodocrosite.** Hawley.

Impregnating the fine granular quartz adjacent to the magnetite-hematite veins at the old mine on the Howes place (Forge Hill), and farther south on the vein in the Cressy pasture. It forms a flesh-colored sandstone which blackens rapidly.

1892. **Rhodocrosite.** Hawley.

The following analysis by Mr. L. G. Eakins, of the United States Geological Survey, represents the composition of the flesh-colored arenaceous rock from the mine of Mr. C. V. Cressy in the pasture just south of the road over Forge Hill.

Part soluble in HCl:

FeO	2.40
MnO	28.44
NiO	.02
CoO	Trace.
CaO	10.98
MgO	1.29
CO_2	28.71
	71.84
Insoluble in HCl, nearly all quartz	26.68
	98.52

RHODONITE.

1824. **Siliceous oxide of manganese.**

Specimens obtained in Chesterfield, but exact locality not learned.

W. Meade: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VII, p. 54.

1824. **Siliceous oxide of manganese.**

Chesterfield, near the locality of sappare (kyanite), associated with green feldspar in granite.

C. U. Shepard: Loc. Min.; ibid., p. 251.

(I have not been able to rediscover this locality, and doubt the occurrence of rhodonite in granite in the Conway schist.)

1825. **Oxide of manganese.** Cummington.

"In immense quantity one-half mile west of Congregational church on land of Mr. Packard. It would be an easy matter to collect at this locality 50 tons of the mineral. * * * I could not find the ore in place, though from the appearance of some specimens I have little doubt that they form a bed in mica-slate. [Suggests that the black coating is derived by oxidation from the pink.] Mr. Bryant, who lives near the spot, pointed out to me a specimen which had been broken a year or two since and which by simple exposure to the weather since that time had already become coated by a thin pellicle of the black oxide."

E. Hitchcock: Loc. Min.; Am. Jour. Sci., 1st series, Vol. IX, p. 22.

1825. **Siliceous oxide of manganese.** Cummington and Plainfield.

In considerable abundance.

J. Porter: Ibid., p. 55.

1827. **Siliceous carbonate of manganese.** Cummington.

At junction of mica-slate and talcose slate, 2 miles north of the meeting-house in Cummington. Exposed in place, several feet wide, 15 to 20 rods long; black and gray oxide in abundance, and along with them there is a small vein of the siliceous carbonate also embedded in the black oxide; it was supposed to contain iron, and a forge was erected. The masses are found on the ground in the immediate vicinity of the vein and scattered clear across the town, and also north in Plainfield.

A. Nash: Lead mines of Hampshire County; Am. Jour. Sci., 1st series, Vol. XII, p. 249.

(This must be the main opening at T. Williams's, which is 3½ miles northwest of Cummington, as a point 2 miles north of Cummington would not be near the junction of the schists.)

1835. **Manganese spar.** Cummington.

C. U. Shepard: Min., Part II, Vol. II, p. 24.

1841. **Bisilicate of manganese.** Plainfield, 1 mile west of center.

"In beds of interstratified layers in talcose slate, rarely more than 2 to 3 feet thick; several of them occur near one another at two principal places represented on the map. Their surface is black or dark gray, apparently the common pyrolusite. In the interior beautiful rose red. Recently analyzed by Dr. Thompson and found to be bisilicate of manganese. In stone walls a little northeast of the meetinghouse in Cummington in numerous large blocks, probably transported thither from the beds above described. In talcose slate."

E. Hitchcock: Geol. Mass., p. 613.

1849. **Mangan amphibol.** (Hermann.) Cummington.

Hermann: Jour. Prac. Chem., Vol. XLVII, p. 7.

(The above name was based on an error and gave rise to the two following names.)

1853. **Hermannit.** (Kenngott.) Cummington.

A. Kenngott: Min., p. 71.

1860. **Cummingtonite.** (Rammelsberg.) Cummington.

C. Rammelsberg: Min. Chem., p. 473.

1868. **Rhodonite.** Cummington.

J. D. Dana: Min., p. 235.

1875. **Cummingtonite.**

"Soll eine Manganhornblende sein."

C. Rammelsberg: Min. Chem., 2d ed., Vol. II, p. 400.

1877. **Hermannit.** Cummington.

F. Zirkel (Nauman): Min., p. 606.

(The ancient error is still carefully preserved and Hermann's mangan amphibol cited.)

1885. **Rhodonite.** Warwick. Near Winchester and Hinsdale, N. H. Cummington, in bowlders.

G. F. Kunz: Precious stones of the United States; Rep. Min. Res. U. S. for 1883–84, p. 766.

1888. **Rhodonite.** Cummington.

"The rhodonite so well known as occurring as bowlders at Cunningham [sic], Mass., has recently been traced to the ledge, and we may now hope to see the rock used extensively for decorative and ornamental purposes, as at this locality it is one of the richest pink and flesh-colored minerals known."

G. F. Kunz: Precious stones, in Min. Res. of the U. S. for 1887, p. 562.

1889. **Hermannit.** Cummington.

Groth: Tabell. Uebersicht d. Min., p. 134.

A persistent error (see 1849, above).

1889. **Rhodonite.** Cummington.

Polished specimens of thin-cut stones and a vase were shown in Tiffany's exhibition of gems at the Exposition in Paris.

G. F. Kunz: Private communication.

1890. **Rhodonite.** Cummington.

Announces the discovery of the ledge. "Fine masses weighing several hundred pounds have been blasted out, and an effort will be made during the coming year to introduce this as an ornamental stone."

G. F. Kunz: Gems and precious stones of the U. S.; Min. Res. of the U. S. for 1888, p. 582.

1891. **Rhodonite.** Cummington, Warwick.

"On Osgood's farm,[1] Massachusetts, and in the neighboring towns; in Warwick, Mass. The rhodonite of Cummington of the richest flesh and light-red color was found only in bowlders previous to 1887, when it was traced to the ledge by W. W. Chapman. Blocks were taken out weighing some hundreds of pounds each, of a rich pink and red color, and with large surfaces entirely free from streaks of black oxide, and in other places beautifully mottled; they were equal in quality and beauty to the Russian rho-

[1] Cummington should probably be supplied here.

1891. **Rhodonite**—Continued.

donite, which is made into vases and also table tops and mantels. This material has been used very effectively in combination with unpolished or stone-finished silver as handles for very fine ornaments, the rose color streaked with black affording a pleasing contrast. Its hardness is only 6.5, but it is nearly as tough as jade.

G. F. Kunz: Gems and precious stones of the U. S., pp. 151, 152

1891. **Rhodonite.** Cummington, Plainfield, Hawley.

I have given in the monograph on the geology of the region a full discussion of the long series of manganesian deposits situated on the fissure, extending from the old manganese mine near the south line of Plainfield, at T. Williams's, where it is exposed in great width, to the well-known mine of specular iron on Forge Hill, in Hawley, and have described the occurrence of rhodonite at many new points along this line. All the masses of the mineral found in Cummington are glacial bowlders from Plainfield, and the reputed discovery of the ledge in Cummington has no basis in fact. A few large bowlders were uncovered in a trench at the old locality and were supposed to be the ledge.

1892. **Rhodonite.**

"Occurs in Cummington and some of the neighboring towns in bowlders; also in Warwick."

E. S. Dana: Sys. Min., p. 380.

RHŒTIZITE.

See Cyanite, 1835.

RUTILE.

1812. **Oxide of titanium.** Worthington.

Dark-red crystal longitudinally striated; the surface splendent and somewhat iridescent; embedded in white, semitransparent quartz, part granular and part compact, which occurs in beds of hornblende slate. From Dr. John F. Waterhouse.

A. Bruce: Bruce's Min. Jour., Vol. I, p. 237.

1818. **Red oxide of titanium.** Leyden, Shelburne.

At Leyden, on quartz and tremolite; brownish-red; sp. gr. 4.232; geniculated, sometimes several geniculations on a single specimen; in one, six.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 116.

1823. **Red oxide of titanium.** (Bruce.) Worthington.

"Leyden; in four- or eight-sided prisms, often handsomely geniculated, generally striated, in limpid quartz, tremolite, and hornblende. Some of the specimens have several geniculations and are as large as the thumb. Hundreds of good specimens have been collected at this locality.

"At Colerain and Shelburne I found it penetrating a vein of quartz in mica slate in place. In Conway a few small crystals have been observed exhibiting the primitive form and presenting the kind of twin crystal described in Rees's Cyclopedia, art. Rutile. May be found anywhere on a strip several miles wide between Conway and Brattleboro, Vt."

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 236.

1824. **Red oxide of titanium.** Cummington.

Dr. J. Porter: Loc. Min.; ibid., Vol. VII, p. 58.

1824. **Ferruginous oxide of titanium.** Chester (Emmons).

It has some resemblance to schorl, but is infusible; occurs in smallish, long, imperfect, nearly black prisms in granite; rare.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 58.

1824. **Red oxide of titanium.** Middlefield (Emmons).

Flat plates in quartz.

Ibid., p. 59.

1824. **Ferruginous oxide of titanium.** Chester.

"I have discovered one large specimen of ferruginous oxide of titanium in granite, or, I ought to say, a mass of granite, containing 20 or 30 imperfect crystals."

E. Emmons: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VII, p. 255.

1825. **Red oxide of titanium.** Norwich (now Huntington).

Near beryl locality in north of town. In large quartz veins in mica-slate.

C. U. Shepard: Bost. Jour. Phil. and Arts, Vol. III, p. 608.

1825. **Red oxide of titanium.**

Cummington, in mica-schist. Plainfield, well crystallized.

J. Porter: Loc. Min.; ibid., Vol. IX, p. 55.

1825. **Red oxide of titanium.** Cummington, Conway, Goshen.

Stone walls; quartz in mica-slate (C. U. Shepard). Leyden, Worthington (Cleaveland), Middlefield, Shelburne.

1825. **Ferruginous oxide of titanium.**

Chester, with augite and actinolite; likewise in sienite. Goshen, in stone wall in mica-schist (Shepard) and quartz.

Robinson's Cat., pp. 42, 51.

1827. **Red oxide of titanium.** Williamsburg.

In quartz in mica-slate; crystals as large as a man's thumb and handsomely geniculated.

Goshen and Chesterfield; Conway and Whately; wherever there are granite veins, or where quartz lies contiguous to mica-slate, and in nests of quartz in mica-slate.

A. Nash: Lead mines of Hampshire County; Am. Jour. Sci., 1st series, Vol. XII, p. 259.

1831. **Red oxide of titanium.** Cummington.

Fine crystal near soapstone quarry.

J. Porter: Loc. Min.; ibid., Vol. XX, p. 170.

1835. **Red oxide of titanium.**

Leyden, with zoisite. Shelburne, Colerain, Conway, Williamsburg, Chesterfield, Middlefield, Whately, in sienite. Windsor, in chlorite slate near the most eastern soapstone quarry, in feldspar, or rather in graphic granite, which occupies seams in chlorite slate.

E. Hitchcock: Geol. Mass., pp. 349, 462.

(The Whately mineral is allanite.)

1838. **Titanium.** Norwich.

Farm of Mr. Quartus Angell, in vein 3 feet wide, with galena and blende.

E. Hitchcock: Econ. Geol., p. 127.

1841. **Red oxide of titanium** or **rutile.**

In mica slate; four to eight sided prisms, generally striated, sometimes geniculated. With zoisite in Leyden, abundant, sometimes penetrating quartz, sometimes is connected with hornblende. Shelburne, in distinct crystals alone. Colerain, Conway; in latter place one or two geniculated prisms more than an inch thick, also in small, right square prisms; Williamsburg, Chesterfield, Middlefield.

E. Hitchcock: Geol. Mass., p. 607.

1844. **Rutile.** (*Rutilus quadratus.*) Shelburne, Leyden. Conway.

J. D. Dana: Sys. Min., p. 420.

1876. **Rutilite.** Pelham, Conway, Shelburne, Chester.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 7.

1883. **Rutile.** Westhampton, Chester.

In geniculate crystals an inch long; north part of Westhampton, at residence of Mr. James Howard. In epidotic hornblende schist in Chester.

E. E. Bancroft, class of 1883, Amherst College.

1884. **Rutile.** Pelham asbestos mine.

Occurs in beautiful, geniculate twins in cavities in tourmaline with apatite prisms and in disseminated red-brown grains and microscopic crystals in massive anorthite, 1½ cm. from contact with massive tourmaline.

1885. **Rutile.** Rowe.

In pyrite at J. M. Davis & Co.'s mine; steel-gray; good crystals.

A. G. Dana: Gahnite of Rowe; Am. Jour. Sci., 3d series, Vol. XXIX, p. 456.

1885. **Rutile.** Chester emery mine.

The rutile follows corundophyllite, generally in fine needles, hair brown, shining, striated; at times bent and twisted; generally grouped into sagenite-like bundles of striated needles; rarely twinned, but at times showing a most beautiful lace-work of needles crossing at 60° and 120°, which is set free by the solution of the calcite; at times shorter crystals occur, 10 by 15 mm. across.

There are fine brown-red sagenite needles in a reticulate network at 60° and 120°, together with striated geniculate twins 10 by 15 mm. across, in the cabinet of the late Mr. Ames, of Chicopee.

SALT.

1880. **Chiastolite.** Near Springfield, Mass.

My attention was called to these forms as problematical, possibly chiastolites, from near Springfield, by Professor Dana, with reference to Mr. B. Horsford, of Springfield, and Mr. J. S. Diller.

1888. **Salt.** West Springfield. (See Pl. I, B, C.)

In black Triassic shale in bottom of Westfield River, near bridge below the town. Skeleton cubes pseudomorph in calcite, appearing on surface of the black shale in white crosses, squares, and triangles one-half to three-fourths of an inch across, which have been for years called chiastolite. They were determined by me from a study of thin sections, and were found to effervesce with acid.

Specimens received from Mr. J. S. Diller, and sections cut.

1889. Cavities from salt crystals in Triassic sandstone. Wilbraham.

Flattened, cubical hollows, with ends 1 by 4 mm. to 4 by 9 mm., in rusty sandstone from the base of the Trias, east of the academy and near contact on mica-schist.

1890. Salt. Holyoke.

In drift near west end of Connecticut River Railroad Bridge. Found by Rev. J. Provost, of Springfield, Mass. Specimen now in the Smith College collections. (See A, Pl. I, from photograph.)

Forms larger and more delicate than at Westfield; largest cube 32 mm. The slender white lines, often with a black central suture, start from a point or from the corners of a small white square with black center. They are often symmetrically bordered by a feathery fringe of white, broadest at base and lessening outwardly, like frost flowers or the microlites in Arran pitchstone. That they are cross sections of skeleton cubes is made clear by sections of the same crystal at right angles to each other on the side and end of the block. The rock is a black shale, and the joint plane at one end is incrusted by coarse calcite with streaks of bitumen and rust.

1890. Salt. Holyoke.

The impressions of minute salt crystals also occur on the very thin, laminated, and fine-grained sandstone cut through in carrying the water main east from Ashleys Pond, in Holyoke, in lines crossing each other at 90°; lines diverging at 60°, and small impressed squares with lines diverging from the four corners.

1892. Spinel. Near Springfield, Mass.

Octahedral crystals tesselated like chiastolite embedded in slate.

E. S. Dana: Sys. Min., p. 222.

1894. Octahedrite. West Springfield.

I have in time past had much correspondence with Mr. Horsford concerning these forms. He considered them a new mineral, an eightfold dissectible crystal, each component having the shape of the octant of an octahedron, and he proposed the name octahedrite for the form. He expressed the intention to publish his results as part of a larger work on geology, of which the manuscript was prepared and partly printed, but never published.

The following quaint letter explains more fully than I have done Mr. Horsford's opinion concerning his mineral, and will be of interest to many who remember his peculiar, Indian-like appearance and his crisp, impulsive speech.

The first lines and the allusion to Professor Shepard are interesting reminiscences of early studies of chiastolite, and refer to the dissected figure, which has for many years appeared in the different editions of Dana, and which has given rise to German citations of chiastolite from Springfield, Mass. As the author died two years ago, and his representatives do not object, and as his promised book will probably not be printed, I reproduce the letter, following religiously the injunction of the author. The letter was accompanied by a small octahedron carefully cut in pine wood, and with blackened corners to show the three black plates mentioned below:

"NORTH THETFORD, VT. (No date. Received about 1890.)

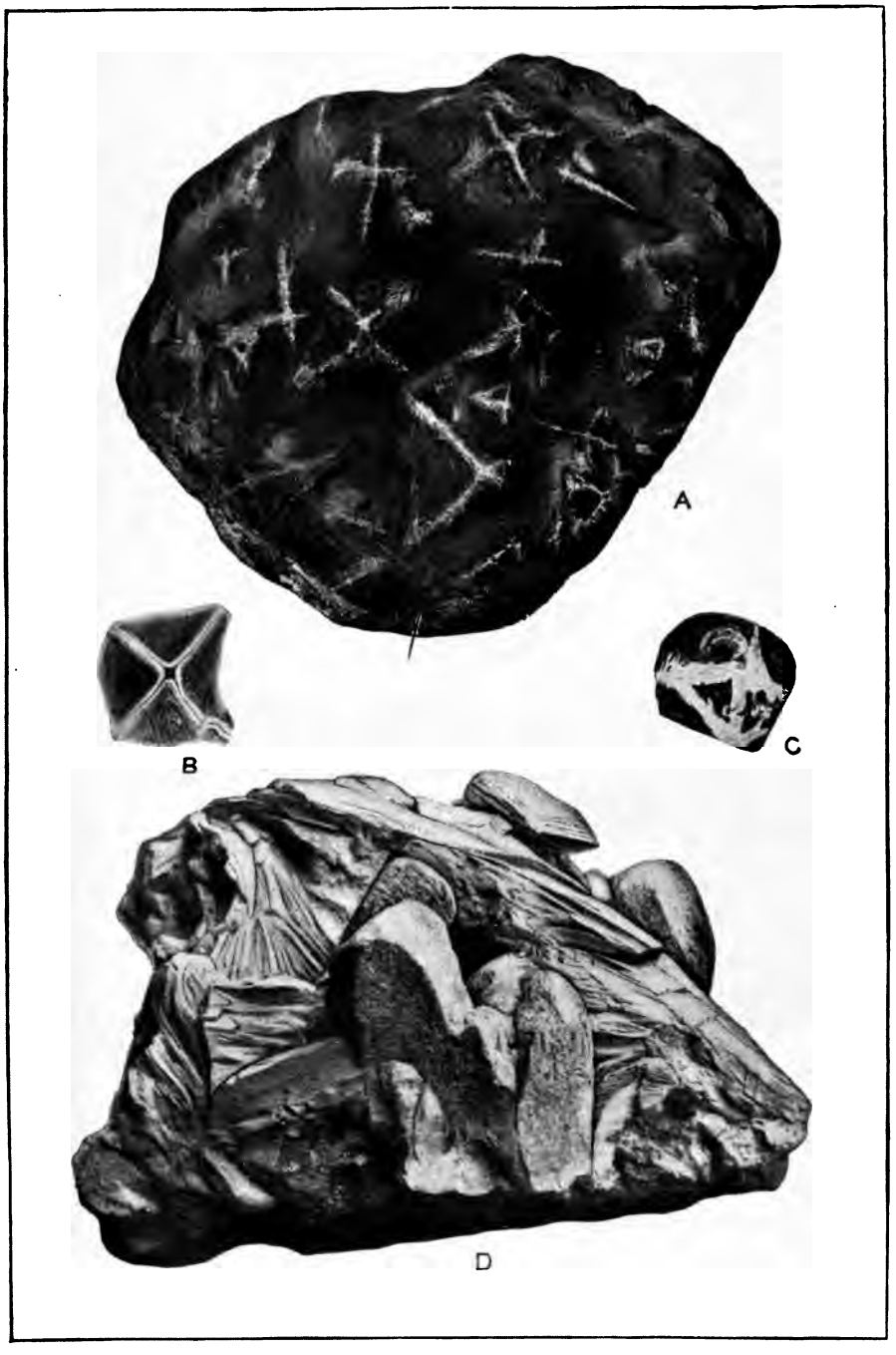
"DEAR SIR: The chiastolite, a right square or rhombic prism, is composed, as you see, of five right square pyramids (black) and four triangular pyramids (white) fearfully elongated, all of massive structure and inseparable. My octahedrite, a regular octahedron, white, is bisected through its angles by three black plates, which diagonally, at right angles, bisect each other. These plates are walls of division; consequently the octahedron is composed of eight triangular pyramids, separable and of distinct laminated structure. You may wonder that a New Englander, a Yankee

1894. **Octahedrite**—Continued.

Puritan thoroughbred, should carry a discovery like this twenty years in his pocket with no effort at heraldry or one attempt to turn it into cash. But you will acquit me of weakness in that direction when I say I had possession of all the specimens discovered and all that would be discovered until there was another upheaval—a contingency I could well risk. I am not able in a letter to say what I would, not knowing just what you desire. My researches for twenty years past are all embodied in a work in publication, and of which I send you the first chapter with the assurance I mean all I say and can sustain it. I could doubtless contribute somewhat to your report, but that could only be by extracts from my own book. I would show you where the mica schist overlies the sandstone and where basalt does the same; where, in an opening in the sandstone, there was an irruption of fetid limestone with stalactites in all the curly crinkles of malachite, but of shades from brown to black. The elder Hitchcock, in his first report on the geology of Massachusetts, described them as radiaria (petrified worms). His engrossing study of bird tracks at that time made the oversight pardonable. You will see at once the position in which I am placed. In my treatise the geology of New England is treated with a philosophic scrutiny it has not before seen, however much needed, holding as it does a more direct and unimpeachable testimony of the earth's early history than any field of equal extent on the globe.

"I acknowledge I am *savage* in treatment of the glacial theory, but assuming less I had better kept silent. But if fact and philosophy both sustain my position, as they certainly do in overwhelming multiplication, I could not say less or too much. I can show you three 100-ton bowlders of granite which have burst asunder in the past five years, one I had known half a century without seam or fracture in it. All burst in one direction, and at the same angle from perpendicular, and through the middle. Would not geologists attribute that work to Achæan time rather than the present? I have never found a specimen 100 feet from one spot (point). I have not been able to obtain a single specimen in the past five years. I have a few crystals developed showing just what the model does. I have a few halves, quarters, and eighths of the octahedron, but consider them invaluable, as they can not be duplicated. I have never sold or given a specimen to any person living. I did not discover for years that the pyramids were separable. You may think I hold this thing with grip of iron, but it is not so. Approaching my eightieth birthday, it is a fair hope that I have gathered a little wisdom or moiety of caution by the way. When I dissected the andalusite, at the solicitation of your late Professor Shepard, I sent description and illustration to the Natural History Society of Boston, but never received a word of reply.

"Two years ago, I think (this is allegory), a doctor came up to Springfield from Harvard to consider the case of a *sickly infant*, administering a dose of *'rehash of old hash'* on the sandstone. Well, either from the prescription or the method of administration, the poor thing gave a gasp or two and 'passed away.' At the close of the lecture, however, we gathered about the speaker for a friendly chat. When the question of the crystals came up, it was thrown back in my face with 'It is beyond my comprehension; I do not wish to know or hear anything in regard to it,' with other exclamations I did not wait to hear (Shaler). These things have been often repeated in my long life of research, so that what I might contribute to the geology of New England, if given at all, must be with the assurance from the Secretary of the Interior that it shall be published in my own words and under my own signature exclusively.



CRYSTALS OF SALT AND HAMPSHIRITE.

A. Pseudomorph in calcite of skeleton crystals of salt.
B. Central section of above salt pseudomorph.
C. Section of corner of same crystals, showing feathery outgrowth.
D. Hampshirite; pseudomorph of serpentine after olivine.

1894. Octahedrite—Continued.

"The crystals are embedded in black shale just like cherries in a pudding. I have them in hundreds, which I should be happy to show you on my return to Springfield.

"Do not mistake me, I am willing to give all the assistance in my power; but as I am publishing it all in a work of my own, I must not impair or imperil that. The survey on which you are engaged must take years of time. I should like to know more about it, as I am, and shall be while I live, actively engaged in geological research.

"I shall be here probably till September.

"Yours, truly,

"B. HORSFORD,
"*North Thetford, Vt.*"

The following appears as a separate marginal note:

FIG. 4.—Section of salt pseudomorph.

"One side of the octahedron, the first discovered. The crossing lines of the triangle are mathematical (please demonstrate)."

1894. Salt pseudomorphs. West Springfield.

Through the kindness of a daughter of Mr. Horsford the finest specimens from his collection have been presented to the collection of Amherst College. They are smaller than those from Holyoke. One slab 7 inches square and finely ice-polished shows the forms in great beauty, and especially six-rayed stars from sections normal to the octahedral axes of the cube.

1894. Calcite pseudomorphs after salt in Triassic shale.

"A specimen of the fine black shale of Triassic age is covered with white lines arranged in triangles, crosses, and lines radiating from the corners of small squares. A feathery outgrowth at times borders these lines. The material is calcite, and the lines are tracings of the various chance cross-sections of skeleton cubes, about an inch in diameter, presumably of salt, replaced by calcite. The extreme delicacy of the forms, the feathery outgrowths, and the lack of broken specimens indicate that they were formed in place in the soft mud. They were, I think, discovered by Mr. B. Horsford, of Springfield, and were much studied by him. They have been called chiastolite, and are cited as spinel in Dana's Manual, 1892. The specimen shown was a bowlder from Holyoke. Mr. Horsford's specimens were from West Springfield."

B. K. Emerson: Bull. Geol. Soc. Am., Vol. VI, p. 473.

SAPONITE.

1882. Saponite. Deerfield.

Product of decomposition of natrolite. In many cases the natrolite has changed peculiarly into saponite. At first the tips of the needles become opaque and crumbling, and this extends to the whole group, and the whole sinks down into small masses from milk-white to straw color, which are spread over the surface of the prehnite like a thick layer of

1882. **Saponite**—Continued.

dried cream, with abundant shrinkage cracks. The hardness is 1 or less. It gives up only a little iron with hydrochloric acid, and is quickly decomposed by hot sulphuric acid. A portion introduced into a drop of water falls asunder much like starch—which it every way resembles—with a series of slight explosions, which occur at first in rapid succession and continue, growing fainter and farther apart, for some little time until the whole is spread in a broad circle upon the glass. This process exposes minute glassy fragments of prehnite. The flakes after their dispersion present a peculiar appearance under the microscope. The first impression is strikingly that of a slide of nearly dried blood corpuscles of uniform size, 0.005 to 0.007 mm., the single disks being variously attached to each other. Separate groups of disks often simulate closely in shape the grub of the common May beetle. The scales polarize brightly in bluish tints and are indistinguishable from kaolin. In many cases a small mass of the mineral seems to have undergone this vermiculite-like reaction in the vein itself, and a delicate bloom is spread in a circle over the prehnite or epidote surrounding a minute hollow cup of the same white or straw-colored material. In one curious case a minute hollow cube, with a side broken in, has a tuft of natrolite needles perched in and around it, these latter having minute dodecahedra of fluor strung upon them, as described below. The whole is now transformed into or coated with the saponite, and a delicate bloom of the same coats the surrounding epidote.

B. K. Emerson: Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 356.

SAPPARE.

See Cyanite.

SAPPHIRE.

1876. **Corundumite.**

Pelham: Blue (sapphire) and gray.

Chester: Blue (sapphire) and brown; the latter mixed with magnetite (emery).

C. U. Shepard: Cat. of Min. within 75 miles of Amherst, p. 6.

See Corundum.

SCHEELITE.

1864. **Tungsten.** Chesterfield.

In albite near cassiterite.

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XXXVII, p. 407.

1867. **Scheelite.** Chesterfield.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst, p. 2.

1868. **Scheelite.** Chesterfield.

The above cited.

J. D. Dana: Sys. Min., p. 606.

(The specimen upon which the above determination was made was probably burned with the Shepard collection. Professor Julien does not mention the species in his exhaustive study of the Chesterfield locality.)

SCOLECITE.

1882. **Scolecite.** Ward's quarry, Pelham.

In Pelham gneiss in fissure with and on prehnite.

In radiated needles 60 mm. in length, single needles 3 mm. in width; in twins P, ∞P, ∞P∞. Swells abundantly under the blowpipe; extinction 14° from the long axis.

1887. **Scolecite.** Granby.

In the eighth volcanic core east of the Notch road in Granby. Veins of bluish agate contain very sharp casts of square prisms 2 by ½ mm. in cross-section with flattened transversely striated ends exactly resembling scolecite.

SCAPOLITE.

See Enstatite, 1835; Zoisite, 1824.

SEPIOLITE.

1876. **Sepiolite**; varieties, meerschaum and hampshirin. Middlefield.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 3.

The termination "ine" was proposed in this pamphlet as a sort of limbo in which poor species might be reserved for adjudication, and "in" for varieties. This suggestion has been nowhere adopted. For hampshirite, see page 91. It is a compact serpentine and has no similarity to sepiolite. The specimens labeled "meerschaum" in the Shepard collection were weathered portions of the Middlefield serpentine bed, which had lost their color and become light and porous from the leaching out of a portion of the mass.

The presence of true sepiolite has not been established.

SERPENTINE.

1818. **Serpentine.** Leyden.

Rolled masses.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. 1, p. 114.

1818. **Serpentine rock.** Southampton, Russell.

At 723 feet from the entrance of the Southampton adit is a stratum of serpentine rock containing very red quartz embedded in various directions. It is very compact and mostly green; here it is but 3 feet thick. It is compared with the Westfield bed; at 670 feet there is beautiful green soapstone.

Also, near line of Westfield and Russell, 4 miles west of Westfield Academy. Very great breadth; in the granitic hill east of highest ridge of granite.

A. Eaton: Southampton adit; Am. Jour. Sci., 1st series, Vol. I, p. 137.

1820. **Serpentine.** Middlefield.

Discovered by E. Emmons. Description given; associated minerals, quartz, steatite, actinolite, talc, dolomite.

C. Dewey: Ibid., Vol. II, p. 236.

1820. **Serpentine.** Westfield.

Four miles west of academy. "I discovered a very extensive bed of serpentine."

A. Eaton: Index, p. 100.

1821. **Serpentine.** Russell.

Specimens sent to Professor Silliman by Dr. William Atwater, and described by the former. Also from a mountain 15 or 20 miles from Westfield, a bluff large as East Rock (probably Middlefield).

Am. Jour. Sci., 1st series, Vol. III, p. 238.

1823. **Serpentine.**

Westfield, in granite (Eaton). Middlefield, associated with steatite (Dewey). Pelham, in a large, loose mass, penetrated by asbestos and associated with talc.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 227.

1824. **Asbestus (Amianthus).**

In very strong and flexible fibers in steatite. Middlefield (Emmons).

Ligniform, white and yellowish-white fibers, stiff and brittle, traversing serpentine in vein at Middlefield (Emmons).

Compact in Middlefield with serpentine.

C. Dewey: Geol. Berkshire; Am. Jour. Sci., Vol. VIII, p. 47.

1824. **Serpentine.** Middlefield, Worthington, Plainfield.

Bed 2 miles long, 2 miles south of the meetinghouse in Middlefield; light and dark green. In neighboring brook white and cream colored; spotted, translucent, beautiful. Both precious and common. In Russell, a little east of south of above, large beds dark-green; has been polished for marble. In Middlefield, east of meetinghouse, connected with great bed of steatite; also Worthington and Plainfield.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 49.

1824. **"Vert antique?"**

A magnesian mineral found in a bed in gneiss on the river in Becket and colored greenish by serpentine. It may, as Dr. Emmons thinks, be a serpentine marble; tough, takes fine polish; effervesces, often yellowish-white.

C. Dewey: Geol. Berkshire County; ibid., p. 58.

(This is the Coles Brook pre-Cambrian chondrodite limestone, which is often partly altered to serpentine.)

1825. **Serpentine.** At the foot of the mountain west of Westfield.

Emerson Davis: Min. Not.; ibid., Vol. IX, p. 252.

1825. **Pimelite.** Middlefield.

At locality of crystallized steatite. (See Pimelite, p. 122.)

C. U. Shepard: Bost. Jour. Phil. and Arts, Vol. III, p. 609.

1825. **Serpentine.** Zoar, Worthington, Deerfield River.

Robinson's Cat., p. 78.

1826. **Serpentine.**

On the mountain 5 miles west of Westfield Academy are two beds of serpentine, one not before mentioned; in mica-slate with limestone at south end of bed and in terstratified with serpentine at right angles, or 90°.

Serpentine intercalates and alternates with an unknown mineral resembling lime 1 inch in thickness; sometimes they are blended. Vein contains schorl and actinolite. A cross section of the bed is as follows: Green talc, serpentine, unknown mineral, serpentine, green talc. On the opposite side of the river, 1 mile north of this, another bed—mentioned by Eaton in Index (Am. Jour. Sci., 1st series, Vol. VI, p. 227, Hitchcock). In mica slate, not in granite. Black, greenish on thin edges, foliated, laminæ with luster of hornblende; sp. gr. 2.6; powder attracted by magnet; proposes variety name "magnetic serpentine." A yellow-green, foliated mineral occurs in the serpentine—probably sahlite. On the Westfield River bank between these localities are bowlders of tons weight of talc with fragments of black serpentine containing 4-sided prisms, hair-brown—anthophyllite?

Emerson Davis: Rocks and minerals of Westfield; Am. Jour. Sci., 1st series, Vol. X, p. 213.

1826. **Serpentine**—Continued.

The first of these localities is Munns Brook, and the unknown mineral is enstatite. The second locality is Atwater's quarry and the mineral bastite (marmolite). The third mineral is enstatite.

1832. **Serpentine.**

Middlefield, south part; one-fourth mile in breadth, 2 miles long in north part, with steatite; precious and common. Blandford, three beds. Westfield, west part, going into Russell, dark, with green talc; has been worked. Pelham, southwest part; dark, much talc. Zoar, southeast side Deerfield River, near turnpike.

E. Hitchcock: Geol. Mass.; ibid., Vol. XXII, p. 30.

1833. **Serpentine.** Zoar, Blandford, Middlefield.

E. Hitchcock: Geol. Mass., p. 30.

1835. **Serpentine.** Zoar, Blandford, Middlefield (two localities).

Blandford, 4 miles northwest of the church on the northeast side of North Meadow Pond; discovered about 1834 by Mr. Simeon Shurtleff (Geol. Mass., p. 305); 30 rods in diameter; stratified; on west, hornblende schist; also 4 or 5 miles south, 40 rods east of soapstone quarry (Osburn's); also bowlders of peculiar green serpentine with talc and schiller spar on east line of town. Westfield, in mica-slate, 4 rods wide, black with talc, scapolite (?), massive garnet, amphibole, and calcite. Russell, apparently in continuation of above, on north bank of Westfield River, black and green with deweylite. Pelham, with talc and asbestos in gneiss. Shutesbury, black, mostly steatite. New Salem, steatite passes into black serpentine in gneiss.

E. Hitchcock: Geol. Mass., pp. 30, 367 ff.

1841. **Serpentine.**

Nearly all above localities cited, especially page 614—a compact topographical résumé. Middlefield and Becket, in cuttings on railroad; a delicate variety mixed with the limestone.

E. Hitchcock: Geol. Mass., Final Report, pp. 159, 567, 610, 614.

1841. **Amianthus.** Russell, in serpentine.

E. Hitchcock: Geol. Mass., p. 618.

1844. **Serpentine.** Westfield, Russell, Blandford, Chester, Middlefield, Charlemont, Zoar.

E. Hitchcock: Ex. Geol. Map, p. 12.

1844. **Serpentine** (*Ophitis communis*). Blandford, Middlefield, Westfield.

J. D. Dana: Sys. Min., p. 309.

1876. **Serpentite.** Chester and Middlefield.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 3.

1876. **Picroline.** Middlefield; Chester.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 3.

1882. **Serpentine.** Russell.

Black serpentine with bastite. Analysis by Prof. C. U. Shepard. Sp. gr. 2.60; H. 5.

SiO_2	44.16
MgO	37.44
FeO	7.05
H_2O	11.00
	99.65

1892. **Picrolite.** Chester.

Beautiful deep leek-green; fibrous, the fibers not easily separating; on alteration becoming colorless, and developing a pearly luster and a micaceous or talcky cleavage, and at the surface changed into a fine tough-fibered serpentine—asbestos. Exposed in a bed several feet across in the railroad cutting at the first bridge north of the Chester station. This is widely separated from the large Chester-Middlefield band.

1893. **Serpentine.**

The series of great serpentine beds which extends across the State from Rowe to Granville is of more lithological than mineralogical interest, and is treated at length in the monograph on the geology of the area. A detailed microscopical study failed to detect any trace of olivine or of olivine structure in any of the beds except the eastern Osborn bed.

The eastern line of beds, from Munns Brook in Granville to Osborn's quarry in Blandford, is derived from coarse enstatite rock. The lower bed at Osborn's quarry is from a coarse pyroxene rock. The long line of beds from Blandford north to Rowe are derived from hornblende-schist, and where the road from Chester to Middlefield crosses the bed one sees the most perfect pseudomorph of serpentine after hornblende-schist imaginable, every detail of structure of the hornblende schist south of the river being repeated on the surface of the vertical walls of serpentine, while on breaking into the mass only the black massive serpentine appears, without a trace of schistose structure. After a long and careful search had failed to find any trace of olivine in these serpentines, I was surprised to find in the so-called serpentine pseudomorphs after quartz from the Middlefield bed pseudomorphs after olivine of large size and great beauty. I have therefore given the history of these forms separately under the name hampshirite (q. v.), although the material is not proved to be a distinct species.

East of the river all the serpentines in Pelham and Shutesbury are derived from olivine.

1894. **Serpentine pseudomorphs after olivine** (formerly called quartz pseudomorphs). Middlefield.

A specimen, presumably unique, was shown, having several large attached crystals more than an inch long, showing the common forms of olivine now changed into a pale yellow serpentine, closely resembling the Snarum forms. The crystals have long been cited as quartz pseudomorphs from Middlefield, but the locality has been lost for many years. This specimen is from the collection of Mr. James Clark, formerly of Brooklyn, and now belongs to Smith College. Its label states that the locality was on the brook which crosses the great serpentine bed in Middlefield, and that it was purposely covered up by someone many years ago.

B. K. Emerson: Bull. Am. Geol. Soc., Vol. VI, p. 473.

1895. Serpentine.

Analyses of serpentines.

[Nos. 1-5 by Mr. George Steiger, in the laboratory of the Survey; No. 6 by Miss H. P. Cook, instructor in chemistry in Smith College.]

	1.	2.	3.	4.	5.	6.
SiO_2	37.82	40.42	36.94	39.14	33.87	40.27
TiO_2	Trace.	None.	Trace.	None.	None.	.....
Al_2O_3	.61	1.86	.50	1.18	.77	5.74
Fe_2O_3	7.92	2.75	6.04	4.46	2.81	
FeO	1.15	4.27	1.94	3.14	4.25	.....
FeS_2	.....	.43	.....	.....	.....	.....
Cr_2O_3	.19	.28	.33	.33	.38	.....
NiO	.45	.53	.40	.47	.33	.....
CoO	.05	Trace.	None.	Trace.		
MnO	.....	Trace.	Trace.	None.	.04	.....
CaO	None.	.66	None.	None.	None.	.....
BaO	None.	None.	None.	None.	None.	.....
MgO	37.94	35.95	38.33	41.45	38.57	40.00
K_2O	Trace.	Trace.	None.	None.	None.	.....
Na_2O						
H_2O-100	.75	.21	.71	.34	.38	.69
H_2O+100	12.50	10.51	12.07	9.48	7.00	13.61
SO_3	.....	Trace.	.20	None.	.20	.....
P_2O_5	Trace.	Trace.	Trace.	.02	Trace.	.....
CO_2	.....	1.44	1.85	None.	10.82	.....
	99.38	99.31	99.31	100.01	99.42	100.31

No. 1. Enstatite changed to serpentine. Granville. H. Cooley's.

No. 2. Rich dark-green serpentine. Rowe. Quarry near R. King.

No. 3. Black serpentine containing marmolite (bastite). Russell. Atwater's quarry.

No. 4. Black-green serpentine, weathering to pale nickel-green with much chromite. North Blandford, from "The Crater."

No. 5. Gray splintery serpentine enveloped in talc. Chester. From the east wall of the old mine.

No. 6. Straw-yellow fibrous serpentine, glazed, enveloping olivine pseudomorphs. Middlefield. From the specimen figured; Plate I.

SILLIMANITE.

1876. Fibrolite. Northfield, Sillimanin, Chester.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 6.

(The Northfield specimens are in bowlders from New Hampshire.)

1878. Sillimanite. Palmer.

Prisms not well formed, but standing out from their marked cleavage.

Groth: Min. Sammlung, Strasburg.

The specimen was doubtless from a bowlder from the range of fibrolite rock in the granite in Belchertown.

1881. Fibrolite. Amherst.

In the feldspathic mica-schist along the west of the ridge on which the village is built from the college grove to the Agricultural College; the rock is spangled in cleavage faces with large (one-half inch) equidistant blotches of shining white muscovite, shot through with blades of fibrolite. This changes with the rest of the rock into an amber-colored, soft agalmatolite (?).

1883. Sillimanite. Belchertown, Enfield.

In the east portion of Belchertown, at house of Mr. J. Clough, commences a great mass of sillimanite gneiss, forming an inclusion in the tonalite. Crystals, square prisms up to 1 inch long.

1885. Sillimanite. East Brimfield. Near house of William Lombard.

The coarsest specimens found in fissures in calcareous pyroxenite, 45 mm. long, 5 mm. wide.

1891. **Fibrolite.** Warwick, south of Harris's soapstone quarry.

In pure white straight fibrous masses of great beauty and large size, resembling pycnite. It occurs in coarse granite on the border of fibrolite schist, and seems, as is often the case, to have been dissolved out of the country rock and concentrated by recrystallization in the pegmatite in purer form. It is the characteristic mineral of the Brimfield schist, which occupies the eastern portion of our area and extends over a large part of Worcester County.

SIDERITE.

1835. **Lenticular carbonate of iron.** South Island, Turners Falls.

For several rods around copper vein, numerous crystals.

E. Hitchcock: Geol. Mass., p. 226.

1858. **Chalybite.** Turners Falls, South Hadley Falls.

E. Hitchcock: Catalogue of State collection; Nos. 111, 112, 6th Report State Board of Agri., p. xx.

(The piece from Turners Falls shows a surface of Triassic sandstone, incrusted with fine, large rhombohedra—$\frac{1}{2}$ R, now changed to limonite. In the specimen from South Hadley Falls fissures in red Triassic sandstone are incrusted with shining red crystals, shot through by long needles of a white mineral, which has now almost wholly disappeared. The specimens are in the survey collection of Massachusetts, made by President Hitchcock, and deposited in the Amherst College Museum.)

1859. **Spathic iron.** Goshen.

With zoisite and specular iron in mica-slate.

E. Hitchcock: Final Cat. State Col. No. 17, Mass. Agr. Rep., App., p. xl.

See Ankerite.

SILVER.

1810. **Silver.**

Loudville, 12½ ounces to the ton.

B. Silliman: Bruce's Jour., Vol. I, p. 69.

1841. **Silver.** Southampton.

A chapter on "Misguided efforts in search of gold and silver."

E. Hitchcock: Geol. Mass., p. 206.

SPHALERITE.

1810. **Blende.** Loudville, Southampton.

Crystals on quartz.

B. Silliman: Bruce's Jour., Vol. I, p. 68.

1823. **Sulphuret of zinc.**

Loudville, foliated and crystallized. Leverett, foliated.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 235.

1827. **Blende.** Hatfield and Leverett.

A. Nash: Lead mines of Hampshire County; ibid., Vol. XII, p. 258.

1835. **Blende.** West Springfield.

In fetid limestone in Paine's quarry and Meacham's quarry; rare. (Triassic.)

E. Hitchcock: Geol. Mass., p. 230.

1838. **Blende.** Russell, Norwich.

Russell, farm of John Gould. Norwich, farm of Quartus Angell. (In quartz veins in Conway schist.)

E. Hitchcock: Econ. Geol., p. 127.

1841. **Blende.** Northampton, Norwich (now Huntington).

The principal ore in vein in Northampton 1 mile northeast of the Loudville vein. (Both baryta-lead veins in granite.) In Norwich 1 mile northeast of the meetinghouse; opened by Quartus Angell; elegant quartz.

E. Hitchcock: Geol. Mass., p. 204.

1844. **Zinc.** Northampton, Norwich.

E. Hitchcock: Explanation of Geol. Map, p. 22.

1859. **Blende in quartz.** Norwich, Holyoke.

Large mass in State collection in Amherst College; from Angell's mine. Cat. No. 200, p. xix.

Fine, transparent cleavage pieces in fissures in clayey limestone. (Trias.) Holyoke. Cat. No. 107, p. xlix. Ibid.

Rep. Agri. of Mass. for 1858, App. lxix.

1882. **Sphalerite.**

Rarely in red-brown grains 5 to 6 mm. long, fresh looking and of high luster in the interior, but generally surrounded by a bright-red rust layer. In prehnite, epidote, and calcite, and in the light-gray diabase, filling cavities lined with diabantite, with curious many-faceted globules.

B. K. Emerson: The Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 350.

1883. **Sphalerite.** Leverett. East mine.

In fine transparent olive-green, complexly twinned crystals nearly an inch across. Found by Mr. E. J. Whitaker, of the class of 1883, Amherst College, and deposited in the college cabinet. From baryta-lead veins in granite.

1891. **Sphalerite.** Hatfield.

Occurs rarely in fine druses of black crystals, in part transparent, and then oil-green; complex twins, mainly ∞ O and O. The blende and the barite together coat the walls of the veins, and quartz follows. From baryta-lead veins in tonalite.

1894. **Sphalerite.** Sunderland.

Large transparent wine-yellow pieces in fetid concretionary limestone at the fossil fish locality in black Triassic sandstone at Whitmore's Ferry.

SPINEL.

1892. **Spinel.** "Near Springfield, Mass."

"Octahedral crystals tesselated like chiastolite," embedded in slate.

E. S. Dana: Sys. Min., p. 222.

These are skeleton crystals of salt, now pseudomorph by replacement in calcite, and occur in the black Triassic shale at West Springfield. (See Salt.)

SPODUMENE.

1823. **Augite.**

Goshen, in granite. Flattened, greenish-gray prisms, sometimes 8 inches long and 2 inches wide, 1 mile north of meetinghouse on Ashfield road.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 225.

1824. **Spodumene.** Vicinity of Conway.

Partially analyzed, light-green color.

George T. Bowen: Jour. Acad. Nat. Sci., Philadelphia; also Am. Jour. Sci., 1st series, Vol. VIII, p. 120.

1824. **White augite.** Goshen.

At the celebrated locality of indicolite.

J. Porter: Loc. Min., p. 233.

1824. **Spodumene?** Chester.

In small quantity in granite.

"By the action of the blowpipe it is first converted into scales or plates, which then melt into a glass; brittle, scratches glass, yellowish or pale green."

C. Dewey: Geol. Berkshire County; Supp. Am. Jour. Sci., 1st series, Vol. VIII, p. 243.

1825. **Spodumene.** Goshen.

"The mineral already described (Am. Jour. Sci., 1st series, Vol. VI, p. 225, Vol. VII, p. 30) as white augite turns out to be spodumene. It exists in various parts of Goshen, especially the northern part. Not as yet noticed in place, but the granite bowlders are so massed that they certainly are the upper portion of a great bed beneath."

E. Hitchcock: Loc. Min.; ibid., Vol. IX, p. 20.

1825. **Spodumene.** Goshen.

"The white augite mentioned in American Journal of Science (1st series, Vol. VIII, p. 233) is I believe, spodumene. Correction."

J. Porter: Min. Not.; ibid., p. 55.

1825. **Spodumene.** Goshen.

"At the celebrated tourmaline locality and several other places."

C. U. Shepard: Bost. Jour. Phil. and Arts, Vol. III, p. 607.

1828. **Spodumene.** Norwich (Huntington).

"Was conducted to hill near the north line of Norwich, where I found spodumene in large laminated masses."

E. Hitchcock: Am. Jour. Sci., Vol. XIV, p. 220.

1831. **Spodumene.** Chesterfield.

In coarse granite with beryl near celebrated tourmaline locality. Crystals large, often apple-green.

J. Porter: Loc. Min.; Am. Jour. Sci., 1st series, Vol. XX, p. 170.

1841. **Spodumene.**

Goshen, most abundant; 2 miles north of village on the Ashfield road; 3 miles northeast on the Plainfield road. Chesterfield, Norwich, Chester; prisms from Chesterfield 21 inches long, though broken at both ends (Dr. Dwight, Cummington); white or gray; small specimens delicate green or light rose.

E. Hitchcock: Geol. Mass., p. 701.

1844. **Spodumene.** (*Petalus triphanus.*) Goshen, Chesterfield, Chester.

J. D. Dana: Sys. Min., p. 360.

1850. **Spodumene.** Norwich.

Analysis.	I.	II.
SiO_2	63.06	62.72
Al_2O_3	28.00	28.85
CaO	.95	1.13
LiO	5.67	5.67
NaO	2.51	2.51
	100.19	100.88

G. J. Brush: Am. Jour. Sci., 2d series, Vol. X, p. 370.

1850. Spodumene. Norwich.

A crystal belonging to Mr. Charles Hartwell was noticed by him at the meeting of the American Association for the Advancement of Science, 1849. On examination Professor Dana finds that the mineral is monoclinic and isomorphic with pyroxene. The crystal is described and figured and measurements are given, and the formula given is 0 P, ∞ P, ∞ P ∞, ∞ P ∞, ∞ P′ ∞, P, 2 P, 2 P′ ∞, 3 P 3 (?), m P n; another crystal has the faces 0 P, 3 P 3, m P n wanting; gives strong lithia reaction. Formula $R_3,Si_2O_3 + 4Al_2O_3Si_2O_3$ (Kobell).

NOTE.—The spodumene of Conway in the same range was tested for lithia successfully in 1824 by G. T. Bowen.

J. D. Dana: Ibid., p. 119.

1853. Spodumene. Norwich.

Reanalyzed as follows:

	No. 1.	No. 2.	No. 3.
SiO_2	64.04	63.65	63.90
Al_2O_3	27.84	28.97	28.70
Fe_2O_3	.64		
CaO	.34	.31	.26
Mgo	Trace.	Trace.	Trace.
Li_2O	5.20	5.05	4.99
Na_2O	.66	.82	.80
K_2O	.16		
Ignition	.50	.50	.60
	99.38	99.30	99.25

Smith and Brush: Ibid., Vol. XVI, p. 371.

1865. Spodumene. Huntington.

Mr. F. R. Allen of the class of '65, Amherst, found a large bowlder of spodumene granite at the west foot of Walnut Hill, with many crystals of a type unusual for the region. Small square prisms very fresh and well terminated. The specimens have been presented to Amherst College.

1866. Spodumene. Winchester, N. H.

Just over the line. Continuation of Goshen formation, on land of Mr. Brown, under barn and in brook-bed near bridge; cleavable masses; most northern location of the species.

C. U. Shepard: Ibid., Vol. XLII, p. 248.

(The term "Goshen formation" refers to the albitic tourmaline granites of Goshen.)

1876. Spodumene. Goshen.

North of Lily Pond in the north of Goshen is a heavy bluff of biotite granite, and a few rods north is a large bedded dike of muscovite granite. In this I found, in 1876, pseudomorphs of muscovite after spodumene 2 inches broad by 6 inches long, and recognized them then as such.

1876. Spodumenite. Goshen, Huntington (formerly Norwich).

C. U. Shepard: Cat. of Min. within 75 miles of Amherst, p. 5.

1878. Spodumene. Norwich.

Analysis affording formula: Li_2,Al_2,Si_4,O_{12}.

C. Doelter: Ueber Spodumene und Petalite; Min. Mit., Vol. I, p. 517.

1879. Spodumene. Goshen, Chesterfield, Huntington.

Goshen, Manning farm. Imperfect bladed crystals up to 2 inches across in coarse aggregate of albite, indicolite, and garnet.

1879. **Spodmene**—Continued.

Barras farm. Rectangular crystals up to 18 inches long, often changed to cymatolite. The well-known tourmaline locality, Chesterfield.

A. Macomber farm; northwest corner of town, 2 miles southeast of village of East Cummington; first opened by Professor Julien in 1870. Clark ledge, the well-known locality of colored tourmalines, contains no spodumene.

West Chesterfield Hollow. Isinglass rock; crystals up to 35 inches long, 10 to 11 inches across, changed to cymatolite, albitic granite, quartz. Vein worked three summers by Professor Julien. Four miles farther south in Huntington (formerly Norwich), on Walnut Hill; the vein which has furnished the finest crystals up to 16 inches long. Chester, 1 mile north of village; opened by Emmons.

Manning farm. Coarse aggregate of albite, indicolite, garnet, and spodumene; where crowded and imperfect grains indicate a more rapid crystallization than in the other localities.

Barras farm. Main vein orthoclase; granite with beryl; central band or secondary vein of cleavelandite and gray-white quartz with spodumene and tourmaline, beryl green and white, garnet, muscovite, columbite, cassiterite—apparently a later deposition of quartz.

Macomber farm. First vein the same; in secondary, 1st, quartz, muscovite, granular albite, tourmaline, spodumene; 2d, cleavelandite, quartz, magnetite, garnet, zircon; 3d, smoky quartz, green and black tourmaline. The larger crystals penetrate through all the formations.

Clark's. Same, no spodumene; 1st, albitic granite, little quartz and muscovite, black tourmaline and garnet; 2d, cleavelandite, black, green, and brown tourmaline, microclin, columbite, cassiterite, zircon, cookeite, lepidolite; 3d, center, smoky quartz.

Chesterfield Hollow. Granite, no beryl, little mica; 1st, orthoclase, huge crystals, 6 to 10 inches; green and white quartz; 2d, albitic granite, green muscovite, spodumene, green, white, and black, 10 to 25 pounds; quartz, columbite, masses one-half pound in weight, zircon, rich in uranium; 3d, quartz and cleavelandite; 4th, magnetite, quartz, zircon, spodumene, yellowish, white, and black; 5th, smoky quartz, green spodumene, green and black muscovite, 2 to 3 inches; columbite, zircon.

Walnut Hill. First, muscovite, granite; 2d, albitic orthoclase, black tourmaline, muscovite, garnet, magnetic quartz; 3d, cleavelandite, with quartz, spodumene, tourmaline, tripolite, cyrtolite, quartz, apatite, muscovite, green, white, and black; 4th, spodumene, muscovite, granite, biotite, magnetite, cyrtolite.

A. A. Julien: Ann. N. Y. Acad. Sci. Arts, Vol. I, pp. 316, 350.

(The article contains careful analyses and a full discussion of them, establishing independently of Doelter the same formula. The paragenesis of the mineral and its alterations into killinite, cymatolite, vein granite, and quartz, are fully described (see p. 115), making this the most valuable article that has been published upon the granitic veins which carry rare minerals in our western hills.)

1885. **Spodumene.** Huntington.

The old locality on Norwich Hill was opened for me in the summer of 1884 by Mr. Frank L. Nason, at a point a little north from the old opening. Very large crystals, the largest 29 by 7½ by 3¾ inches, were found, rarely well terminated, and of a clear gray color without the slight flesh color of some of the older crystals. They were covered with dendrites. Several fine twins, twinned parallel to $\infty P \infty$, were found. The great crystals are

1885. **Spodmene**—Continued.

often crushed, the parts much slipped on each other, being sheared many times by a force acting about at right angles to the vertical axis, and then recemented; slipping often 2 to 10 mm. They are also often bent, one 16 by 4½ by 2 inches is bent 45° without breaking. Another, the largest obtained, is broken or thus bent more than 40 times, the breaks often changing into flexures, and the whole is firmly recemented. (See fig. 5.)

FIG. 5.—Bent and faulted crystals of spodumene from Walnut Hill, Huntington, × ⅓. The lower crystal has been faulted several times and recemented in the ledge. The upper one has several small monoclinal folds.

1889. **Spodumene.** Goshen.

Mr. Alvan Barras has been excavating the spodumene in very large quantities a mile northeast of his house, opposite the sawmill at J. B. Taylor's, and New York capitalists have done some blasting at the Manning locality about a mile farther east. Samples have been sent to Paris to see if lithium could be profitably obtained from it.

1890. **Spodumene.** Chesterfield.

The best crystal of spodumene from Chesterfield—I presume from West Chesterfield Hollow—is in the collection of Columbia College, collected by Mr. A. A. Julien. It is a terminated crystal about 35 by 12 mm. in cross-section.

1890. **Spodumene.** Huntington.

Dr. E. Hitchcock sold the finest crystal ever obtained from Norwich Hill for $50 to W. J. Knowlton, of Boston. I can not discover its present owner.

1894. **Spodumene.** Chester, Huntington, Goshen.

In a quartz vein in mica-schist implanted in albite.

C. Hinze: Handb. Min., p. 1121.

(All the occurrences of spodumene are in coarse pegmatite veins in mica-schist. Within these pegmatite veins the minerals containing rare elements are found in secondary veins of albitic granite, which often have a zonal arrangement with a center of smoky quartz, into which the large spodumenes sometimes project, and are then terminated.

These pegmatite veins form an outer fringe of dikes around the great central stock of granite.)

STAUROLITE.

1819. **Staurotide.** Northfield.

In mica-slate 1 mile east of village, on Boston turnpike; six-sided prisms; also garnets.

E. Hitchcock: Sup. Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 436.

1823. **Staurotide.**

Everywhere across the State in the eastern range of mica-slate. North Wilbraham, Ludlow, Shutesbury, Leverett, Northfield.

In abundance in the western range of mica-slate in Chesterfield, Cummington, Plainfield, Hawley. In Chesterfield a mica-slate band 2 or 3 feet thick contains seven or eight distinct layers.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 219.

(I doubt the occurrence of the mineral in any of the eastern range of towns, except Northfield.)

1824. **Staurotide.** Norwich.

Abundant in mica-slate.

E. Emmons: Ibid., Vol. VII, p. 254.

1824. **Staurotide.** Very common in towns about Middlefield (Emmons).

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 40.

1841. **Staurotide.** In mica-slate in Norwich, Chesterfield, Goshen, Hawley, and Heath.

E. Hitchcock: Geol. Mass., p. 593.

1844. **Staurotide.** (*Carbunculus decussatus.*) Chesterfield.

J. D. Dana: Sys. Min., p. 385.

1861. **Staurolith.** Chesterfield.

Large black and brownish-black crystals, accompanied by light and dark mica and albite. Sp. gr. 3.772.

SiO_2	28.86
Al_2O_3	49.19
Fe_2O_3	3.20
FeO	13.32
MnO	1.28
MgO	2.24
H_2O	.43
	98.52

C. Rammelsberg: Pogg. Ann., Vol. CXIII, p. 599.

1877. Staurolite.

Blandford, east of Blairs Pond, in feldspathic mica-schist. The best cabinet specimens occur here in both forms of twinning. The mineral is confined to the Goshen and Conway schists and to the Devonian mica-schists of the Bernardston series in their more eastern and northern extension, especially around South Vernon.

1885. Staurolite. Whately.

Exquisite microscopical twins occur, forming with muscovite pseudomorphs after chiastolite in the argillite at contact with the tonalite.

1894. Staurolite.

The analysis of 1861, cited above, is quoted as "angeblich aus Massachusetts (Chesterfield?)."

C. Rammelsberg: Neues Jahrbuch; Beilage-Band IX, p. 480.

STIBNITE.

1823. Sulphuret of antimony. Near South Hadley (Gibbs).

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 236.

1825. Sulphuret of antimony.

Cleaveland's Min., p. 688.

1825. Sulphuret of antimony.

Robinson's Cat., p. 70.

(A doubtful occurrence.)

STILBITE.

1818. Stilbite. Deerfield.

Not abundant; associated with chabasite; crystals small, well defined.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 114.

1823. Stilbite. Deerfield.

Crystals appear to be right prisms, whose bases are rhombs, with angles about 60° and 120°; rarely exceed one-tenth inch. Often grouped in foliated masses.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 224.

1824. Stilbite. Chester.

With chabasie in single, oblique, four-sided prisms with rhomboidal terminations, and grouped sometimes in bundles and globular masses and radiating from a center. Called zeolite by Professor Dewey, but does not gelatinize with acids. In fissures of veins in mica-slate about 1 mile east of meetinghouse in Chester.

E. Emmons: Loc. Min.; ibid, Vol. VII, p. 254.

1835. Stilbite? Goshen.

No. 1529 in State collection; a zeolite (?) on granite from Goshen.

E. Hitchcock: Geol. Mass., p. 507.

1841. Zeolite(?). Belchertown (Three Rivers).

In gneiss with prehnite.

E. Hitchcock: Geol. Mass., p. 639.

(Should be Palmer.)

1844. Stilbite. (*Zeolus fasciculuris.*) Chester.

J. D. Dana: Sys. Min., p. 328.

1859. **Stilbite.** Goshen.

White fibrous, radiated on drusy quartz in fissure of fine-grained gneiss. Cat. Mass. Col., No. 159; Rep. on Agri. of Mass., for 1858, Appendix, p. lxviii.

1882. **Stilbite.** Chester.

On dark-gray fine-grained fresh gneiss; stout, square prisms, ∞ P ∞, ∞ P ∞̆, 0 P with fluted sides and slightly rounded end; wine yellow; the single prisms graduate into openly radiated bundles with deep red-brown chabasite, the two growing together so as to show them to have been formed at the same time. Also twinned tubes and cubo-octahedrons of pyrite, the latter newer and one-eighth of an inch long. The fine specimen from which these notes were taken was destroyed in the burning of the Shepard collection. It came probably from the locality cited above by Emmons.

1882. **Stilbite.** Deerfield.

This occurs generally in separate narrow fissures with comparatively fresh walls, associated only with heulandite, chabazite, calcite, pyrite, and diabantite, but it is found sometimes resting on prehnite. It appears (*a*) in circular forms with radiated structure 10 to 20 mm. in diameter, and up to 2 mm. thick, either spread separately or aggregated so thickly as to cover the whole surface, or in small hemispheres; Farther south, opposite Deerfield, fine globular forms as large as a marble rest upon the gashed quartz, and secondly (*b*) in small stout scopiform crystals, ∞ P ∞, ∞ P ∞̆, 0 P, of dull yellow color. The first form occurs associated with calcite, and rarely chabazite; the second with heulandite and chabazite, and I examined a flat surface of the trap, 4 feet square, one-half of which was covered with radiated stilbite, at first thickly covering the surface, then separating into distinct disks, and then quite suddenly replaced along a straight line by heulandite with which was associated chabazite, and rarely the small prismatic crystals of stilbite. A third form of stilbite (*c*) is in interlaced crystals 4 mm. long, perfectly pellucid, with even, highly polished faces ∞ P ∞, ∞ P ∞̆, 0 P. Under the microscope the mineral shows a fine rigid lining parallel to 0 P, which seems to mark lines of growth, and has no effect upon the polarization. At right angles to this run (1) long lines of flat water cavities, often negative forms in whole or part, or such forms many times repeated and indicating quite rapid crystallization, and (2) sharply marked lines of multiple twinning, the whole crystal being made of fine plates which increase in number from below upward, new plates being intercalated and old ones obliterated, as in a compound coral. The new plates sometimes appear as points and increase upward with curved faces, and sometimes the old crystal develops a P-face upon which the new one is based.

Products of the decomposition of stilbite.—Kaolin (?). Many broad surfaces of the trap are covered with snow-white stellate patches of stilbite, which show all stages of the decomposition of the mineral into kaolin (?). In specimens already become snow-white and opaque, the kaolin can be seen under the microscope in minute rounded scales and aggregations of these into beaded lines, which are crowded in between the laminæ of the stilbite, the latter showing no signs of change, but remaining limpid and polarizing apparently as vividly as in the freshest specimen. In other pieces where the change is nearly complete, the mass shows only aggregate polarization, and only traces of the stilbite remain.

B. K. Emerson: The Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 357.

1886. Stilbite. Monson.

From the north end of the Flynt quarry in gneiss. Incrusting broad surfaces with colorless radiated needles and small crystals; also in broad, laminated, flesh-colored mass filling a vein in the northwest of the quarry. Small colorless-bladed crystals in reticulated groups on chabazite.

1891. Stilbite. Orange, Buckland.

Orange: In broad flesh-colored radiations with prehnite on surfaces of Monson gneiss in the cutting east of the station. Buckland: In fissures in gneiss in the quarry on the railroad near Shelburne Falls, with chabasite, natrolite, epidote, and babingtonite.

STOLZITE.

1866. Scheeletine. Manhan lead mine, Southampton.

"This mineral was handed me for determination by Mr. Clark, of Northampton. He found the few unknown crystals occupying together a cellular quartz gangue, nearly one-half inch long and three-eighths of an inch in diameter; right square prisms, imperfectly terminated by acute hemihedral pyramids; the faces are not altogether plane, presenting a dissected or unfinished appearance. Color pale, wax yellow, passing into gray. The inner portions are grayish black, with shade of blue with submetallic luster; otherwise the luster is adamantine. Before the blowpipe it decrepitates slightly, melts easily, yielding lead and dark-gray globules with borax yellow while hot gray and opaque on cooling; with salt of phosphorus yellow while hot, colorless on cooling, with excess greenish-yellow while hot, opaque to grayish when cold; with NO_5 dissolves with yellow residue, which gives with metallic zinc the reaction for wolframium.

"As scheelite and cassiterite occur in Chesterfield, we may well be encouraged to persevere in efforts to find tin in workable quantity not far distant."

C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLI, p. 215.

1885. Stolzite.

The specimen upon which Professor Shepard made his observations was burned with his collection. The remaining specimens have passed with the Clark collection into the possession of Smith College, Northampton, and have the original label of Mr. Clark, with the note that it is the same that was submitted to Professor Shepard, and determined by him to be scheeletine. The best specimen contains several groups of small crystals, $3\frac{1}{2}$ by $1\frac{1}{2}$ mm. in cross-section, black, with metallic luster and peacock tarnish, which have smooth shining faces with the form P (111), $\frac{\infty P2}{2}$ (120).

The prism has striation parallel to the intersection with the pyramid and the form agrees exactly in proportion of parts with the crystals from Zinnwald (Naumann, Pogg. Ann., Vol. XXXIV, p. 373, pls. 3, 8; Quenstedt, Min., p. 499, fig. 3).

The largest crystals are formed by the partial coalescence of several of these long square prisms, resulting in stout square prisms with deep longitudinal grooves on the prismatic faces. Moreover, these long prismatic faces are built up of smaller crystals, which are not only in parallel position, but are of common size and arranged in vertical rows between the grooves mentioned above, and they terminate above and below in sharp pyramids, thus giving the whole a peculiarly ornate gothic appearance. In part the black color extends to the surface in these larger crystals; in part, and especially toward the end, they are dull wax yellow. The partial

1885. **Stolzite**—Continued.

crystals present a greater complexity of form; the combinations P (111), $\frac{\infty P 3}{2}$ (π 120), $\frac{2 P \frac{4}{3}}{2}$ (π 342). P (111), $\frac{\infty P 3}{2}$ (π 120), P ∞ (101). P (111), P ∞ (101), ∞ P 2 (120), $\frac{3 P 3}{2}$ (π 131). P is rough, as if regularly picked with a needle point, P ∞ smooth, shining; ∞ P 3 smooth, rounded; P 3 rough. The crystal showing the latter combination is remarkable for showing ∞ P 2 holohedral and for a beautiful hemihedrism; all the pinnacles at one end of the big prism running out in P, ∞ P; on the other end in P alone, with two opposite faces so developed that the pinacles all end chisel-shaped. It shows thus the same development as Naumann (loc. cit., fig. 10, fig. 4; Quenstedt, Min., p. 499), and isolated crystals of this form also occur, which have ∞ P 2 hemihedral and all the faces developed in the same relative proportion as in Naumann's fig. 10.

The large crystals are coated by a great number of minute reddish-yellow crystals, which sometimes form a crust upon them, which on ground of imperfect blowpipe diagnosis were thought to be vanadinite by Professor Shepard. They are in parallel position with the larger crystal, and a careful examination with a strong lens shows that they have the same crystalline form—the ground pyramid with a rounded trito prism. They are, therefore, a second generation of stolzite or a later incrustation of wolfenite. With the common isomorphism and common occurrence of the two species, it is not easy to say which is the fact. The reddish-yellow color is that of the later wulfenites of the locality.

There is a specimen from Loudville in the Clark collection, nearly a decimeter square, of a massive black mineral, very heavy, with conchoidal fracture, pitchy luster, resembling black pitchstone or pitchblende.

It is delicately veined with white cerussite, and on the reverse side runs out into the quartz in stout-square prisms much like those of stolzite, which the mineral resembles strongly. It is labeled by Mr. Clark "marasmolite, Professor Shepard thinks, or perhaps copper glance," and on a separate label "black cerussite," but it proves on analysis to be stolzite.

SULPHUR.

1818. **Sulphur.** Conway, Shelburne, and Warwick.

On mica-slate.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 114.

1823. **Sulphur.**

Pulverulent; perhaps from decomposition of some sulphuret.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 230.

1824. **Sulphur.** Cummington.

In the singular mineral discovered by Dr. Porter (cummingtonite, Dewey). Also Middlefield and Chester (Emmons) in rock with bright-green mica.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 54.

1882. **Sulphur.** Northfield.

In cavities in decomposing pyrite layers in hornblendic gneiss on sharp east slope of Trowbridge Hill, on north line of State, in minute crystals.

1883. **Sulphur.** Leverett.

In hornblende-schist in drusy cavities lined with beautiful minute crystals.

1895. **Sulphur.** Hatfield.

At the lead mine in small globules on altered galena.

TALC.

1818. Steatite. Shutesbury.

(Localities said to be given on map which accompanied the article in first and second editions of this volume of the Journal, but not the later ones. I have not seen it.)

Indian pots, pipes, etc.

E. Hitchcock: Geol. Deerfield dyke; Am. Jour. Sci., 1st series, Vol. I, p. 113.

1818. Soapstone. Southampton lead mine.

At 670 feet in on the tunnel.

"Beautiful green soapstone, very compact, but rather softer than that kind used for inkstands."

A. Eaton: Am. Jour. Sci., Vol. I, p. 138.

1820. Soapstone. Middlefield.

Discovered by E. Emmons.

Professor Dewey: Ibid., Vol. II, p. 236.

1821. Soapstone, magnesian stone. Middlefield.

"A quarry of this species of stone at Plainfield, in the west of Hampshire, has been wrought to a considerable extent. I have seen a house faced with it in Northampton." (On Round Hill, occupied by Clark Institute. Should be Middlefield. See 1826, below.)

Dwight's Travels, Vol. 1, p. 34.

1821. Steatite. Loudville, with barite.

Cleaveland's Min., Vol. I, p. 437.

1822. Crystalline steatite. Middlefield.

C. Dewey: Am. Jour. Sci., 1st series, Vol. IV, p. 274; Vol. V, p. 249.

1823. Crystalline steatite.

Ibid., Vol. VI, p. 334.

The above citations refer to crystals of serpentine after olivine; see Chrysolite.

1823. Steatite.

Southampton (Cleaveland). Middlefield, in steatite (Dewey). Pelham, Rowe. Cummington (J. Porter). New Salem, bed in gneiss.

E. Hitchcock: Geol. Conn. River; ibid, p. 228.

1824. Steatite.

Middlefield, white, green white, deep green, large folia. Chester, brown talc forming veins in mica slate (Emmons). Large bed 2 miles east of the meetinghouse; extensively quarried and transported to Boston as freestone. Also at Worthington.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 51.

1825. Steatite. Zoar.

In serpentine.

Robinson's Cat., p. 78.

Zoar is a village in Charlemont. The soapstone is across the line, in Rowe.

1826. Soapstone.

"The house on Round Hill, in Northampton, mentioned by President Dwight, is built of soapstone—not from Plainfield, where the rock does not occur, but, as the owner informed me, principally from Middlefield."

J. Porter: Min. Not.; Am. Jour. Sci., 1st series, Vol. X, p. 19.

1827. **Talc in steatite.** Cummington.

One-half mile north of Hubbard's leather manufactory.

A. Nash: Lead mines of Hampshire County; ibid., Vol. XII, p. 260.

1828. **Steatite.** West Granville.

Good bed 1 or two miles southeast of meeting-house.

E. Hitchcock: Ibid., Vol. XIV, p. 222.

1832. **Steatite.**

Rowe, white and deep green. Shutesbury, south part. Wendell, south part. New Salem, 2 miles east of village.

Not so good on east as on west side of river.

E. Hitchcock: Geol. Mass.; ibid., Vol. XXII, p. 32.

(The Wendell occurrence is a large bowlder northwest of Locks Pond.)

1833. **Steatite.**

Middlefield, northeast part; one of the finest beds in the State; contains dolomite. Blandford, wrought. Granville, two beds. Zoar, two varieties—white and deep green. Rowe, two varieties.

E. Hitchcock: Geol Mass., p. 32.

1835. **Steatite.** Middlefield.

Mr. William H. Butler has just opened a new quarry there.

Ed. note: Am. Jour. Sci., Vol. XXVII, p. 382.

1835. **Steatite.** Rowe, Zoar, Middlefield, Granville, Shutesbury, New Salem.

In gneiss.

E. Hitchcock: Geol. Mass., p. 357.

1841. **Steatite.** Above localities.

Middlefield, delicate green. The variety of talc called nacrite, one-half mile west of the meetinghouse; in talcose slate.

Ibid., pp. 610, 613.

1844. **Steatite.** Above localities.

E. Hitchcock: Ex. Geol. Map.

1876. **Talcite.** Rowe, Chester, Zoar.

C. U. Shepard; Cat. of Min. within 75 miles of Amherst.

1891. **Steatite.** Richmond, N. H. Harris's quarry.

In beautiful coarse radiated masses and in large amount, derived from the alteration of the anthophyllite (gedrite) described on page 86. It is quarried extensively and carried to Athol, where it is worked.

TETRAHEDRITE.

1835. **Gray copper**

"I have seen a specimen from Brimfield; I infer that it originated from gneiss."

E. Hitchcock: Geol. Mass., p. 399.

Doubtful occurrence.

THOMSONITE.

1841. See Natrolite.

TITANITE.

1824. **Silico-calcareous oxide of titanium.** Chester.

Imperfect prisms, light brown, with augite and actinolite; also in syenite.

E. Emmons: Loc. Min.; Am. Jour. Sci., 1st series, Vol. VII, p. 254.

1824. **Silico-calcareous oxide of titanium.** Middlefield.

Imperfect prisms, rather lighter colored, but much resembling that of Brattleboro, Vt.

C. Dewey: Geol. Berkshire County; ibid., p. 58.

1835. **Sphene.**

Middlefield and Chester, in hornblende slate. Pelham, in gneiss.

E. Hitchcock: Geol. Mass., pp. 381, 398.

1841. **Sphene.**

In hornblende-slate in Middlefield and Chester.

Ibid., p. 624.

1844. **Sphene.** (*Rutilus obliquus.*) Pelham.

J. D. Dana: Sys. Min., p. 421.

1876. **Titanite.** Pelham, Belchertown, Chester.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 7.

1882. **Titanite.** Pelham.

Rare, in pale-yellow to chocolate-colored crystals, 1 mm. to 5 mm. in length; in specimens of feldspar labeled albite by Professor Shepard in Amherst College collection; also in the common gneiss 2 miles north of the asbestos mine in flat, well-formed crystals, and in small grains everywhere in Monson gneiss.

1892. **Titanite.** Pelham.

Honey-yellow crystals (G. = 3.541, Pirsson). Chester, with diaspore.

E. S. Dana: Sys. Min., p. 715.

TOPAZ.

1824. **Topaz (?).** Middlefield, Chester.

Middlefield: Small crystals in serpentine; some prismatic and tetrahedral, yellow, brittle, H. > 7; lying loosely among disintegrated mineral.

Pycnite (subspecies); Chester: In gneiss bowlders; bluish-green, 6-sided prisms terminated by planes, and angles truncated; imperfectly foliated perpendicular to the axis; luster of lateral planes vitreous; infusible; sp. gr. toward 4; less hard than beryl, which it resembles; largest crystal 1½ by 1½ inches; several at times united parallel to each other (Emmons).

C. Dewey: Geol. Berkshire County; Am. Jour. Sci., 1st series, Vol. VIII, p. 40.

[Not elsewhere cited; the first probably quartz, the second was probably apatite.]

1825. **Pycnite.**

In detached pieces of gneiss resembling beryl.

Robinson's Cat., p. 42.

1825. **Topaz (?).** Goshen.

See Beryl.

E. Hitchcock: Ibid., Vol. IX, p. 180.

TORBERNITE.

1879. **Torbernite.** Chesterfield Hollow.

Associated with spodumene and resulting from change of zircons containing uranium.

A. A. Julien: Spodumene and its alterations; Ann. N. Y. Acad. Sci. and Arts, Vol. I, p. 354.

TOURMALINE.

1811. **Tourmaline.** Goshen.

Lately discovered on estate of Mr. Weeks, of this city, to whom we are indebted for the discovery. (Short description.)

Dr. Bruce: Bruce's Jour., Vol. I, p. 123.

1818. **Schorl, black.** Pelham, Shutesbury, Orange.

E. Hitchcock: Geol. Deerfield; Am. Jour. Sci., 1st series, Vol. I, p. 114.

1819. **Tourmaline.** Chesterfield.

Notes on locality. Discovered by Dr. Hunt.

On tourmalines, etc., at Chesterfield.

Col. G. Gibbs: Ibid., Vol. I, p. 348.

1822. **Tourmaline.** Plainfield.

Good crystals in quartz.

Dr. J. Porter: Ed. note; ibid., Vol. IV, p. 55.

1824. **Tourmaline.** Cummington.

Black in milky quartz; uncommonly fine.

J. Porter: Loc. Min.; ibid., Vol. VII, p. 252.

1824. **Schorl, blue.** Norwich (now Huntington).

Near white rocks one-half mile west and visible from Pitchers Bridge in coarse granite.

E. Emmons: Loc. Min.; ibid., p. 254.

1824. **Tourmaline.** Middlefield, Chester, Norwich.

In granite veins in mica-schist.

Indicolite and green tourmaline in vein of granite in mica schist with silicious feldspar (albite), beryl, prismatic mica, green feldspar, and rose quartz. One green crystal 2 inches long and blue inside; 2 miles south of meetinghouse in Chester (Emmons).

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 42.

1824. **Schorl.** Pelham.

In large masses not regularly crystallized, but exhibiting a crystalline tendency. (At asbestos quarry.)

C. U. Shepard: Loc. Min.; ibid., p. 235.

1826. **Tourmaline.** Worthington.

Well crystallized, radiated, glassy, black, of great elegance. Plainfield.

J. Porter: Min. Not.; ibid., Vol. X, p. 18.

1827. **Schorl.** Williamsburg.

In veins of granite in mica slate and in granite lying contiguous to mica slate; terminated. Chesterfield. Frequently stellated.

A. Nash: Lead mines of Hampshire County; Ibid., Vol. XII, p. 259

1828. **Tourmaline.** Chesterfield.

"The vein has been laid open 10 to 12 feet in length. I found Mr. Clark the proprietor, very accommodating and reasonable in his charges for minerals. He will pack boxes for gentlemen at a distance who request it."

E. Hitchcock: Loc. Min.; ibid., Vol. XIV, p. 215.

1828. **Tourmaline.** Norwich (now Huntington).

Near whetstone quarry on west slope of Walnut Hill.

Fine black schorl crystals 1 to 2 inches long and completely covering the convex side of a mass of mica-schist a foot long and 10 inches wide.

E. Hitchcock: Ibid., p. 220.

1829. **Tourmaline**, green. Chesterfield.

Analysis by Gmelin; green variety; sp. gr., 3.102.

BO_2	3.88
SiO_2	33.80
Al_2O_3	39.61
Fe_2O_3	7.31
MnO_2	2.88
NaO	4.95
Loss	.78
	98.33

Ibid., Vol. XV, p. 389.

1835. **Tourmaline.** Chesterfield.

The vein is about 1 foot in width; crystals small, rarely perfect, deeply striated, much curved often, and rifted by cross seams into which the quartz is thrust; green crystals with red center, especially in quartz; single crystals in albite often pure red or green.

C. U. Shepard: Min., Vol. II, 2d ed., p. 245.

1841. **Tourmaline.** Chesterfield.

Many crystals are in a state of internal disintegration; the interior is then often found in a fibrous state.

Teschemacher: Bost. Jour. Nat. Hist., Vol. IV, p. 36.

1841. **Acmite?** Chester.

E. Hitchcock: Geol. Mass., p. 614; also No. 2180 in Cat. of State Col., p. 815, and No. 120, under "Talcose slate," in Final Cat. of State Col. Sixth Ann. Rep. Mass. Board of Agri., App., p. xlv, 1858.

(Referred with doubt to acmite, but finally catalogued as hornblende. It is the black hexagonal tourmaline from the north emery mine.)

1841. **Schorl. Tourmaline.**

Not common in mica-slate; one large slab found in Norwich with crystals standing out upon the surface of the size of a goose quill; generally acuminated. Almost every variety found in the granite; full description given. Common schorl, Pelham.

E. Hitchcock: Geol. Mass., pp. 606, 637, 702.

(The above slab is in the Amherst collection.)

1844. **Tourmaline.** (*Turmalus rhombohedrus.*) Chesterfield, Goshen.

J. D. Dana: Sys. Min., p. 389.

1852. **Tourmaline.** Goshen.

Regular twins; prisms crossing at right angles; rare; a similarity in composition has been observed between the tourmaline and the rock which incloses it; e. g., rubellite in lepidolite; soda-tourmaline in albite.

C. U. Shepard: Min., 3d ed., p. 221.

1860. **Tourmaline.**

Zu Chesterfield in Massachusetts kommen grüne Tourmaline mit rothen Kernen in Topaz vor. (Error.) Seyfert und Söchting (A. A. O., p. 206).

Söchting: Einschlüsse von Mineralien, p. 199.

1865. **Tourmaline.** Chester emery mine.

Highly prevalent throughout the whole vein, especially in North Mountain; more frequent near sides of vein; at some places interlaminated through its entire mass. Crystals often several inches long, fascicular and radiating; longer axis conforming to the bedding; six-sided, unterminated, brownish black.

C. U. Shepard: Report Chester emery mine, p. 11.

1866. **Radiated tourmaline.** Warwick. Grace Mountain.
C. U. Shepard: Am. Jour. Sci., 2d series, Vol. XLII, p. 248.

1866. **Tourmaline.** Chester.
With emery, as at Naxos.
J. L. Smith: Ibid., p. 92.

1876. **Tourmalinite, indicolin, rubellin.**
Tourmalinite: Black, Pelham; green, Chesterfield, Goshen; blue (indicolin), Goshen, Chester; red (rubellin), Chesterfield, Goshen.
C. U. Shepard: Cat. of Min. within 75 miles of Amherst, p. 6.

1882. **Tourmaline.** Northfield, Brush Mountain.
Abundant crystals; termination R,—½ R.
W. E. Webster's collection; Northfield.

1883. **Tourmaline.** Pelham, at the asbestos mine.
Masses of black tourmaline occur 10 to 20 inches across, which afford at times very large imperfect crystals 4 to 8 inches in length, and quite frequently fine, small, perfectly terminated specimens showing the two flat rhombohedra and uniformly a small brilliant 0 P face. These break out of the compact mass of the same mineral, but a film of a compact talc-like mineral surrounds the termination; also small crystals of a deep red-brown occur. The mineral also forms curious micropegmatitic intergrowths with the basic feldspars.

1885. **Tourmaline.** Huntington.
At the new opening for spodumene on Norwich Hill only black tourmaline was found, and that was not abundant. One great crystal 17 inches long, 4.7 inches across at the large end, is nearly cylindrical for two-thirds its length and then tapers in the last third to a rude point, as if a large hand had rudely molded it, the deep imprint of the fingers remaining at the other end. It is terminated by 0 P, the edge of which is replaced by the small faces of a flat rhombohedron.

1891. **Tourmaline.** Chesterfield.
Crystals of tourmaline 1¼ inches across and 4 inches long, mottled green and blue outside, deep green on the inside. From Macomber's ledge; and the finest from this locality are in the collection of Columbia College. They were collected by Mr. A. A. Julien.

1891. **Tourmaline.** Chester.
Quite fine black doubly terminated crystals 1 inch long, short and stout like those from Monroe, Conn. In coarse chlorite schist in railroad cutting near village.

1894. **Tourmaline.** Chester.
The radiated and fasciculite-like tourmaline occurs finely at the new mine just across the road and river to the north of the old mine. I have reexamined the mineral and find its prisms measure 60°. It is uniaxial and deep emerald green by transmitted light. A chemical examination made by Mr. Arthur J. Hopkins, instructor in chemistry, gave silica 32.30 and a strong test for boron. This examination was made because the mineral has recently been called hornblende again, which it much resembles in the smooth faces and hexagonal form of the prisms.

1894. **Tourmaline.** Northfield.
An interesting locality has recently been opened by blasting by Mr. C. H. Webster, of Northfield. Leaving the gulf road at school No. 6, and going east a half mile on the Erving road, and then south a fourth of a

1894. **Tourmaline**—Continued.

mile, the crystals are found in a quartz vein which lies in the line of the great Northfield fault. The crystals are 10 to 20 mm. wide and the longest about 8 cm. long. They are inclosed in white quartz and are much broken and recemented. They show the crystalline faces ∞ R 2, ∞ R $\frac{5}{4}$, ∞ R, — $\frac{1}{2}$ R, —2 R.

1894. **Tourmaline.** Warwick.

High up on Mount Grace in hornblende-schist the mineral occurs abundantly in radiating groups about an inch across of shining black striated needles. It occurs also diverging in both directions from a plane which is only marked by a line of fine black grains and from which the needles go out at right angles. The tourmalines have often absorbed all the iron from the surrounding rock, and a fine granular quartzite slightly tinted by epidote remains.

TREMOLITE.

See Zoisite, 1818, and Amphibole, 1835.

TRIPHYLITE.

1850. **Staurotide.** Norwich (now Huntington).

Spodumene locality on farm of C. Hartwell. Black, semimetallic luster; crystals 1½ inches in breadth. New crystalline form.

J. D. Dana: Am. Jour. Sci., 2d series, Vol. X, p. 121.

1851. **Phosphate of iron, manganese, lithia.** Norwich.

In quartz with spodumene; crystals one-fourth to above an inch in length. At first supposed to be black staurotide, with which it is isomorphous; differs from triphyline in absence of cleavage.

J. D. Dana: On the physical and crystallographical characters of the phosphate of iron, manganese, and lithia of Norwich; Ibid., p. 101.

1851. **Triphylite.** Norwich.

Chemical examination. Sp. gr. 2.876.

	No. 1.	No. 2.
PO_5	41.35	44.04
Fe_2O_3	27.36	26.02
MnO_3	24.70	23.30
Al_2O_3	Trace.	Trace.
LiO	2.27	2.20
CaO	1.97	1.61
MgO	Trace.	Trace.
H_2O	2.07	2.07
	100.01	100.14

$RO,3R_2O_3,3PO_5$.

W. J. Craw: Chemical examination of a phosphate of iron, manganese, and lithia from Norwich, Mass.; ibid., Vol. XI, p. 99.

1852. **Triplite (alluaudite?).** Norwich.

Figured and angles given; considered monoclinic; described.

C. U. Shepard: On the triplite (alluaudite) of Norwich; Proc. Am. Assoc. Adv. Sci., Vol. VI, p. 234.

1853. **Triplite.** Norwich.

The crystals are referred by Shepard to the monoclinic system; angles given.

The above article noticed in Am. Jour. Sci., 2d series, Vol. XV, p. 445. Editor's note. The reviewer defends the rhombic crystallization of the mineral.

1853. **Triphyline.** Norwich.

The triphyline on alteration loses its alkali takes up water and oxygen, the iron and manganese become peroxides. The mineral from Norwich is of this kind.

Scientific intelligence; Am. Jour. Sci., 2d series, Vol. XV, p. 445.

1854. **Phosphate of iron and manganese.**

First observed by Dr. E. Hitchcock, jr., and Mr. Hartwell. Analysis; considered it an altered mineral.

J. W. Mallet: Ibid., Vol. XVIII, p. 33.

1862. **Triphyline.** Norwich.

The center of some of the altered crystals is found to be green and distinctly cleavable and to be triphyline—its first identification in this country.

G. T. Brush: Ibid., Vol. XXXIV, p. 402.

1879. **Triphylite.** Norwich.

Analysis of the unaltered interior of a crystal. Color grayish-green; sp. gr. 3.534.

	No. 1.	No. 2.	No. 3.
P_2O_5	44.72	44.80	44.76
FeO	26.40	26.40	26.40
MnO	17.87	17.80	17.84
CaO	.16	.33	.24
MgO	.49	.45	.47
Li_2O	9.37	9.34	9.36
Na_2O	.32	.38	.35
H_2O	.53	.30	.42
	99.86	99.80	99.84

Li Fe PO_4.

S. L. Penfield: Chemical composition of triphylite; ibid., 3d series, Vol. XVII, p. 226.

1891. **Triphylite.** Huntington.

Most of that from Huntington is altered to the center by the peroxidation of the manganese and iron and the removal of most of the lithia. Fine large crystals are sometimes found attached laterally to large spodumene crystals.

URACONITE.

1852. **Uranochre.** Chesterfield.

C. U. Shepard: Min., 3d ed., p. 144.

1879. **Uranochre.** Chesterfield Hollow.

In fissures in spodumene resulting from change of autunite and torbernite.

A. A. Julien: Spodumene and its alterations, p. 354.

URANITE.

See Autunite.

VANADINITE.

1866. **Vanadinite.** Manhan lead mine, Southampton.

The very rare crystals of stolzite are at times partially incrusted by a red-brown somewhat botryoidal mineral, which affords the blowpipe reaction of vanadinite, though the quantity employed in the trial did not permit a complete verification of this inference."

C. U. Shepard: On the scheeletine at the Southampton lead mine; Am. Jour. Sci., 2d series, Vol. XLI, p. 215.

1885. **Vanadinite.**

A careful examination of the reddish-yellow crusts upon the original specimen of stolzite in the Clarke collection in Smith College shows that they are made up of quadratic crystals P (111) $\frac{\infty P 3}{2}$ (π 130) of stolzite or wulfenite; probably the latter.

VERMICULITE.

See Jefferisite.

1882. **Diabantite-vermiculite.** Deerfield. Cheapside Railroad cutting, in trap.

The steps of the process by which the diabantite changes to a vermiculite are given above under Diabantite. The material, although quite characteristic, hardly requires a separate specific name.

B. K. Emerson: The Deerfield dyke and its minerals; Am. Jour. Sci., 3d series, Vol. XXIV, p. 201.

VESUVIANITE.

1824. **Idocrase.**

Hyacinth-red; luster vitreous; fracture uneven (Emmons). Imperfect crystals, sometimes nearly one-fourth of an inch in diameter; prism terminated by low pyramids. Chester, with actinolite, epidote, chlorite; also Worthington (Emmons).

C. Dewey: Geol. Berkshire County; Am. Jour. Sci., 1st series, Vol. VIII, p. 44.

Doubtful occurrence.

VILLARSITE.

1882. **Villarsite.** Pelham.

Much of the chrysolite at the asbestos mine has lost its disseminated ore, become hydrated, and exactly resembles this mineral. It has a pale olive-green color, becomes friable, and the grains are softer than olivine.

VIVIANITE.

1883. **Vivianite.** Hadley.

In the insect-bearing leaf beds which crop out in the east bank of the Connecticut River 100 rods above the bridge over the Fort River, near its mouth. These leaf beds are cross sections of old beds of the Fort River. The vivianite occurs as a replacement of leaf stems, and disseminated in the fine sand in quite large patches. It often coats the wings of insects.

WAD.

1820. **Oxide of manganese.** Deerfield, Leverett.

E. Hitchcock: Am. Jour. Sci., 1st series, Vol. II, p. 374.

1823. **Oxide of manganese.** Leverett.

In alluvial soil forming a bed 5 or 6 inches thick a few inches below the surface; granular. Deerfield, crusts on quartz and mica-slate.

E. Hitchcock: Geol. Conn. River; ibid., Vol. VI, p. 235.

1833. **Oxide of manganese.** Leverett, Whately, Conway.

Up to 1 foot thick.

E. Hitchcock: Geol. Mass., p. 123.

1841. **Oxide of manganese** or **wad.**

Bog deposit in Leverett, Whately, Conway; sometimes up to 1 foot thick. Ibid., p. 318.

1876. **Wad.** Leverett lead mine.

As dendrites and as aggregates in cavities of minute black shining scales, which in a few days lost their high luster and sank into a brownish-black powder having the properties of common wad.

1882. **Wad.** Deerfield.

Occurs scattered over much of the prehnite in dots often massed together over a surface otherwise clean, in long diamond shapes, the shadows of elongated calcite scalenohedra which have disappeared.

B. K. Emerson: The Deerfield dyke; Am. Jour. Sci., 3d series, Vol. XXIV, p. 351.

WASHINGTONINE.

1876. **Menaccanite** var. **washingtonin.** Chester.

C. U. Shepard. Cat. of Min. within 75 miles of Amherst, p. 7.

WASHINGTONITE.

See Menaccanite.

WERNERITE.

1824. **Scapolite.** Chester.

C. Dewey. (See Zoisite, 1824.)

1825. **Scapolite.** Charlemont.

J. Porter. (See Zoisite, 1825.)

1826. **Scapolite.** Goshen.

J. Porter. (See Zoisite, 1826.)

1835. **Scapolite.** Westfield.

C. U. Shepard. (See Oligoclase, 1835.)

Is a coarse granular plagioclase near oligoclase. Specimen preserved in Mass. State Col., Sec. XIII, No. 32. Cat. in Mass. Agri. Rep. 1859, App., p. xlvi.

1841. **Scapolite.** Chester.

E. Hitchcock: Final Rep., p. 606. (See Zoisite, 1824.)

1841. **Scapolite** or **petatite.**

E. Hitchcock: Final Rep., p. 618. (See above, 1835.)

1844. **Scapolite.** (*Scapolus pyramidalis.*) Chester.

J. D. Dana: Sys. Min., p. 357.

WULFENITE.

1811. **Molybdate of lead.** Loudville.

Description.

Wm. Meade: Bruce's Jour., Vol. I, p. 151.

1823. **Molybdate of lead.** Above quoted.

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 234.

1835. **Yellow lead ore.** Pyramidal lead baryta. Loudville.

Rare.

C. U. Shepard, Min., Part II, Vol. II, p. 285.

1885. Wulfenite.

Was obtained in considerable abundance at the last opening of the mine at Loudville. The finest suite of crystals in the Clark collection in Smith College.

Color smoke gray, lemon yellow, orange yellow to yellowish red. The gray, yellow, and orange crystals are present respectively in different crystallographic types. The two former colors are comparatively rare; the orange deepens to a tint only a shade less deep than the Phœnixville crystals. The luster is vitreous to resinous in the red shades; subadamantine in the other colors.

The crystals are distantly attached by their edges to the cavernous quartz, and only very rarely occur in continuous crusts, as at Phœnixville. This appears in the deep-red type, which then can scarcely be distinguished from the Phœnixville occurrence, except by the lesser luster of certain faces. They are thick to thin-tabular, the largest 10 mm. across—average 5 mm. At times a delicate groove is carried around the 0 P face near its edge on P ∞ like the groove around the edge of a book cover; rarely in the smoke-gray crystals a deep claret-colored line occupies the same position and extends through the thickness of the crystal. At times a lemon-colored crystal is increased by an outward band of orange-colored material. The crystals occur in four distinct types. The smoke-gray crystals, which have a shade of yellow in them and are opaque from included foreign substance, are marked by the absence of hemihedral faces and the prevalence of hemimorphism. They are in thin tables and the rims of the crystals are occupied by faces of the zones of P and P ∞ in about equal degree. A few of the clear lemon-yellow crystals are of this type. The largest crystals are ¾ inch square.

Combinations represented:

1st. 0 P (001), $\frac{1}{16}$ P ∞ (1, 0, 16), $\frac{1}{12}$ P ∞ (1, 0, 12), $\frac{2}{5}$ P ∞ (205), P ∞ (101), ∞ P ∞ (100), ¼ P (113), ∞ P (110), ∞ P 3 (310).

2d. 0 P (001), P (111), ¼ P (113), $\frac{1}{16}$ P ∞ (1, 0, 16), P ∞ (101), ∞ P (110); hemimorphic, the other end showing only 0 P (001).

3d. 0 P (001), ⅓ P (443), ⅔ P (332), 2 P 221, ½ P ∞ (102), ∞ P ∞ (110), m P n undetermined; hemimorphic. ⅓ P (443) is new; angle on 0 P (001) observed 71° 15′; calculated 71° 25′ 4″.

4th. 0 P (001), $\frac{1}{16}$ P (1, 1, 16); hemimorphic: 0 P (001); alone below.

The second type is lemon yellow, thick, tabular, generally neither hemimorphic nor hemidedral, with few faces, and with the P ∞ zone predominant, but the P zone well marked. Combinations are:

1st. 0 P (001), P (111), $\frac{1}{16}$ P (1, 1, 16), ½ P ∞ (102).

2d. 0 P (001), P ∞ (101); hemimorphic: below is 0 P (001), $\frac{\frac{7}{13} \text{ P } 7}{2}$ (π 7, 1, 75) $\varphi \bigvee c = 8^{\circ}\ 20'$.

The third type is of rich orange-red and very rare. The crystals are almost perfect cubes of the base and the trito-prism $\frac{\infty \text{ P } 3}{2}$ (π 310) with generally a trace of the second pyramid P ∞ (101). A beautiful specimen covered with cubes of this type is in the cabinet of Smith College. Thick tables with rounded edges may be associated with this type; they seem made up of 0 P (001), ∞ P (110), $\frac{\infty \text{ P } 3}{2}$ (π 310), P ∞ (101).

The fourth type is by far the most abundant. The crystals are an orange yellow to deep orange—almost red—and are in broad square plates, never very thin, and bounded by the faces of P ∞ (110), which rarely occur alone with 0 P (001), but which are always so predominant as to decide the habit of the crystal. The rounded, polished face of the trito-prism $\frac{\infty \text{ P } 3}{2}$ (π 310) is rarely absent. P (111) and a long series of other

1885. **Wulfenite**—Continued.

faces appear only in traces. 0 P (001) is, however, generally not a true face, but is made up of a series of flat pyramids.

Typical combinations are:

1st. 0 P (001), P ∞ (101).

2d. 0 P (001), P ∞ (101), P (111).

3d. 0 P (001), P ∞ (101), $\frac{\infty P 3}{2}$ (π 310).

4th. 0 P (001), P ∞ (101), ∞ P 3 (π 310), $\frac{\infty P \frac{6}{5}}{2}$ (π 650).

5th. 0 P (001), P ∞ (101), $\frac{\infty P 3}{2}$ (π 310), $\frac{1}{16}$ P (1, 1, 16), $\frac{1}{12}$ P (1, 1, 12), ∞ P ∞ (100), ∞ P (110), P (111), $\frac{1}{3}$ P (113).

6th. 0 P (001), $\frac{1}{16}$ P ∞ (1, 0, 16), $\frac{\infty P 3}{2}$ (π 310), P ∞ (101); hemimorphic; the other end = O P (001).

7th. 0 P (001), $\frac{1}{12}$ P (1, 1, 12), P ∞ (110), P (111), $\frac{1}{3}$ P (113); hemimorphic; the other end = $\frac{1}{16}$ P (1, 1, 16), 0 P. $\frac{1}{16}$ P ∨ 0 P = 5° 54′; $\frac{1}{12}$ P ∨ 0 P = 7° 27′.

The following is a list of the forms observed, with a word of description of the faces:

2 P (221), d. rare, shining.
$\frac{3}{2}$ P (332), r. rare, shining.
$\frac{4}{3}$ P (443), γ rare, shining (new).
P (111), n. shining, small.
$\frac{1}{3}$ P (113), s. shining, small.
$\frac{1}{12}$ P (1, 1, 12), *0* dull, curved (new).
$\frac{1}{16}$ P (1, 1, 16), w dull, curved.
P 3 (131), λ (new).
P ∞ (101), e. most common, large, dull, rarely shining.
$\frac{2}{5}$ P ∞ (205), z. rare.
$\frac{1}{2}$ P ∞ (102), u. dull.
∞ P (110), m. narrow, shining.
∞ P ∞ (100), a. narrow, rough.
0 P (001), c. dull.
∞ P 3 (130), g. common, shining, rounded.
∞ P $\frac{6}{5}$ (650) ν (?), common, notched.
$\frac{7}{15}$ P 7 (7, 1, 75), φ rare, dull.
$\frac{1}{16}$ P ∞ (1, 0, 16) b.
$\frac{1}{12}$ P ∞ (1, 0, 12) β.

The face ∞ P ∞ (100) is rarely present when the rounded $\frac{\infty P 3}{2}$ (π 430) occurs, but in its place a trito-prism turned out but a little from the position of the proto-prism and regularly notched like the so-called milling of a coin by the oscillatory repetition of ∞ P 3 and ∞ P. It can not be measured and I have assigned it doubtfully to ∞ P $\frac{6}{5}$, from which it can not widely differ.

Wulfenites of the yellow type rest on stolzite, and a crust of minute reddish crystals on the same is probably also wulfenite in the form P (111) $\frac{\infty P 3}{2}$ (π 130).

Analysis of the wulfenite detects chromium, but no vanadium. Paragenesis:

1. Calcite,
Quartz,
Wulfenite,
Pyromorphite.

2. Galena,
Quartz,
Stolzite,
Wulfenite.

1885. **Wulfenite**, alteration product of. Manhan lead mine, Loudville.

There is a single specimen in the Clarke collection labeled "Cotunnite, according to Professor Shepard," which possesses the following peculiarities: It is in thin, quadratic, and octagonal plates resembling exactly the thin, pale, yellow type of the wulfenite, but is exteriorly snow-white and opaque; in the interior, however, it is translucent, pale, yellow, with resinous luster.

ZIRCON.

1820. **Zircon.** Brimfield.

In adularia; found in a well near the residence of the late Gen. William Eaton by his daughter. Color of smoky quartz; four-sided prisms with four-sided ends.

A. Eaton: Index, p. 94.

1823. **Zircon.** Brimfield, in gneiss (Eaton).

E. Hitchcock: Geol. Conn. River; Am. Jour. Sci., 1st series, Vol. VI, p. 220.

1825. **Zircon.** Brimfield.

Robinson's Cat., p. 39.

1876. **Zirconite** var. **cyrtolin.** Ware.

C. U. Shepard: Cat. of Min. within 75 miles of Amherst College, p. 6.

1879. **Zircon.** Chesterfield Hollow.

Rich in uranium; minute double pyramids, rarely three-sixteenths of an inch in diameter; in albitic granite; rare but perfect crystals in quartz, core of vein.

A. A. Julien: Ann. N. Y. Acad. Sci. Arts, Vol. I, p. 351.

1879. **Oerstedite.** West Chesterfield Hollow.

Frequently found in black octahedra, not only implanted on the outer planes of these pseudomorphs, but also inclosed in the yellow mixture of cymatolite and muscovite.

A. A. Julien: Ibid., p. 329.

1879. **Cyrtolite.** Walnut Hill, Huntington.

In albitic granite in central quartz core of vein.

A. A. Julien: Ibid., pp. 327, 351, 352.

1883. **Zircon.** Pelham asbestos quarry.

In tourmaline and compact plagioclase (andesite and anorthite), in Pelham asbestus quarry. Crystals just visible to the eye; bright, transparent, red hyacinths with polished faces, long quadratic prisms doubly and complexly terminated P, 3 P, 3 P 3. These are with the microscope red to olive-green by transmitted, red to amber by reflected, light; also colorless adamantine "jargons," showing with transmitted light a faint reddish tinge.

ZOISITE.

1818. **Tremolite.** West part of Leyden, near Green River.

In mica slate. Very abundant.

E. Hitchcock: Geol. Deerfield Dyke; Am. Jour. Sci., 1st series, Vol. I, p. 114.

1823. **Tremolite, Zoisite.** Leyden.

"A mineral has been found at Leyden in great quantities associated with quartz, limestone, etc., and sometimes forming the gangue of the red oxyd of titanium. * * * Also at Colerain (?), at Shelburne (?), at Conway (?),

1823. **Tremolite, Zoisite**—Continued.

at Goshen, and in various instances in vast abundance. This mineral has generally been called tremolite, and sometimes zoisite, but it is probably scapolite."

E. Hitchcock: Geol. Conn. River.; ibid., Vol. VI, pp. 223, 225.

1824. **Scapolite.** Goshen.

Scapolite of a silver-gray color associated with quartz. The surface of the crystals is longitudinally striated and generally dull, but on being broken they exhibit a structure distinctly foliated with a shining luster. Published as tremolite in Vol. VI, Am Jour. Sci.

J. Porter: Loc. Min.; ibid., Vol. VII, p. 252.

1824. **Zoisite.** Chester.

Gray, flattened prisms, striated.

C. Dewey: Geol. Berkshire County; ibid., Vol. VIII, p. 44.

1824. **Scapolite.** Chester.

Gray and white; pearly luster; scratches glass; sometimes four-sided prisms; generally irregular, often intersecting variously; melts to porous yellow-white glass with ease. Chester, with hornblende, augite, etc.; resembles tremolite.

C. Dewey: Geol. Berkshire County; ibid., 1st series, Vol. VIII, p. 44.

1824. **Scapolite.** Southwest of Goshen.

Crystals several inches long. Surface striated, foliated; longitudinal fracture, shining, even; a metallic luster, the color a lively silver-gray; splintery crystals sometimes curved and crystals curiously interlaced; some smaller crystals with shining faces and nearly transparent. Here, as in Chesterfield, in white quartz.

J. Porter: Ibid., Vol. VIII, p. 233.

1825. **Zoisite.** Hawley, near Iron Works.

In veins of quartz in hornblende rock. "It surpasses in beauty any which I ever beheld."

C. U. Shepard: Bost. Jour. Phil. and Arts, Vol. III, p. 609.

1825. **Scapolite.**

Very abundant by the roadside about a mile east of Hall's Tavern, Charlemont (Dr. H. M. Wells, of Windsor).

J. Porter: Loc. Min.; ibid., Vol. IX, p. 54.

1826. **Zoisite.** Worthington.

Remarkably beautiful.

J. Porter: Am. Jour. Sci., Vol. X, p. 18.

1826. **Scapolite.** Goshen.

J. Porter: Ibid., Vol. X, p. 18.

1827. **Zoisite.** Worthington, Conway, Chesterfield.

A. Nash: Lead mines of Hampshire County; Am. Jour. Sci., 1st series, Vol. XII, p. 259.

1828. **Zoisite.** Hawley (C. U. Shepard), Chester, Leyden.

Dirty gray with rutile.

Robinson's Cat., pp. 42, 57.

1828. **Zoisite.** Chesterfield.

One mile north of meetinghouse on land of Mr. Searl.

With kyanite and anthophyllite.

E. Hitchcock: Loc. Min.; ibid., Vol. XIV, p. 216.

1835. **Zoisite.** Goshen, Hawley, Middlefield, Chester, Chesterfield, Conway, Windsor, and especially in large quantities in North Leyden.

E. Hitchcock: Geol. Mass., p. 346.

1835. **Zoisite.** Hawley.

Very beautiful gray crystals of small diameter compared with their length, at Hawley, penetrating small beds of quartz in hornblende rock. Goshen and Williamsburg in veins in granite in mica-slate.

C. U. Shepard: Min., 1st edition, Vol. II, p. 184.

1836. **Zoisite.** Williamsburg.

SiO_2	40.21
Al_2O_3	25.59
Fe_2O_3	8.55
CaO	23.28
H_2O	1.71
	99.34

T. Thompson: Outlines Min., Vol., I, p. 271.

1841. **Zoisite.** Goshen, Hawley, Middlefield, Chesterfield, Conway, especially Heath and north part of Leyden.

E. Hitchcock: Geol. Mass., p. 606.

1841. **Scapolite.** Chester (Emmons).

In veins in mica slate associated with hornblende, pyroxene, and garnet, but the crystallization is generally confused and indistinct (Emmons's Min.).

E. Hitchcock: Geol. Mass., p. 606.

1844. **Epidote (Zoisite).** (*Carbunculus rhombohedrus.*) Chester, Chesterfield, Heath, Leyden, Williamsburg.

J. D. Dana: Sys. Min., p. 379.

1857. **Zoisite.** Goshen.

Analysis.

SiO_2	40.06
Al_2O_3	30.67
Fe_2O_3	2.45
CaO	23.91
MgO	.49
H_2O	2.25
	99.83
Sp. gr	3.341

C. Rammelsberg: Pogg. Ann., C., p. 133.

1876. **Zoisite.** Pelham.

Small, thin, nearly transparent, colorless crystals, much resembling euclasite in form; also in columnar aggregations; both varieties embedded in crystals of black tourmalinite. H. 6.5; sp. gr. 3.3; before the blowpipe like zoisite.

SiO_2	42.20
CaO	22.00
Fe_2O	7.10
MgO	2.08

C. U. Shepard: Contrib. to Min. (priv. pub.). p. 4.

1880. **Zoisite.** Williamsburg.

There is a magnificent zoisite in the Smith College collection; an eight-sided gray prism 1¼ inches in diameter, 2 inches long, with feldspar in center, and associated with chlorite.

1881. **Zoisite.** Williamsburg.

WILLIAMSBURG, *January 27, 1881.*

DEAR SIR: Yours received this day. Plumose mica abounds on what is known here as Gear Hill, about 1 mile northwest, near the hamlet called Searsville. I have found it plentiful there for some sixty years, and have supposed it the best locality known. Found only within the circuit of a few hundred acres.

Epidote or zoisite last procured by me was found 4 miles hence on the Ashfield road, upon land owned by Andrew I. Hitchcock. A large bowlder full of it, associated with hornblende schist, has been thoroughly broken up, mostly carried away, I think. I have not explored for it much in this region. I merely have a Yankee guess it may be found near by there.

Many years since I have found it in various places in Goshen; also found it in Worthington; a few most beautiful crystals. Now I should not know where to find it in this town of Worthington.

You can find a large mass of it on land of Elisha Mason, some 3 miles west of the East Village in Cummington. Mr. Robbins, in East Village, or A. C. Chapin, in the West Village, are excellent guides or directors.

In the same range we find it in Colerain, and in Halifax, Vt. In Colerain, near Heath line, on land near Anson Dwight, who knows the place. I have a hundred-pound mass of it rolled up on a bank for someone's use.

Yours, truly,

MORRIS DWIGHT.

1882. **Zoisite.** Pelham asbestos mine.

Embedded in massive tourmaline; sp.gr. 3 to 3.2; H. 7.5; before the blowpipe fusible to blebby green glass.

Analysis.

SiO_2	41.27
Al_2O_3	12.20
Fe_2O_3	9.82
CaO	23.20
MgO	2.08

Analysis unpublished.

C. U. Shepard, 1875.

(In small, elongate crystals 1 inch in length, of yellowish color, and in colorless masses with radiate columnar structure. In the last opening of the mine the mineral was found in highly lustrous, transparent prisms a half inch across, colorless and completely fresh. It was embedded in black biotite.)

1887. **Zoisite.** Shelburne Falls.

From large bowlders in a well; large, foliated masses of the finest light-pearl gray; stout prisms; not terminated, and smaller blades interlaced with quartz to form a rock.

In collection of Amherst College.

1890. **Zoisite.** Shelburne.

Three-quarters of a mile northeast of Center, south of Charles Smith's place.

Large bowlders north of road to Center. Many terminated crystals, very simple and untwinned; gray, changing to transparent hyacinth red at termination.